

Updated 11/05/14

FEDERAL PROJECT

BIDDING INSTRUCTIONS

FOR ALL PROJECTS:

1. Use pen and ink to complete all paper Bids.
2. As a minimum, the following must be received prior to the time of Bid opening:

For a Paper Bid:

- a) a copy of the Notice to Contractors, b) the completed Acknowledgement of Bid Amendments form, c) the completed Schedule of Items, d) two copies of the completed and signed Contract Offer, Agreement & Award form, e) a Bid Guaranty, (if required), and f) any other certifications or Bid requirements listed in the Bid Documents as due by Bid opening.

For an Electronic Bid:

- a) a completed Bid using Expedite® software and submitted via the Bid Express™ web-based service, b) an electronic Bid Guaranty (if required) or a faxed copy of a Bid Bond (with original to be delivered within 72 hours), and c) any other Certifications or Bid requirements listed in the Bid Documents as due by Bid opening.
3. Include prices for all items in the Schedule of Items (excluding non-selected alternates).
4. Bid Guaranty acceptable forms are:
 - a) a properly completed and signed Bid Bond on the Department's prescribed form (or on a form that does not contain any significant variations from the Department's form as determined by the Department) for 5% of the Bid Amount or
 - b) an Official Bank Check, Cashier's Check, Certified Check, U.S. Postal Money Order or Negotiable Certificate of Deposit in the amount stated in the Notice to Contractors or
 - c) an electronic bid bond submitted with an electronic bid.
5. If a paper Bid is to be sent, "FedEx First Overnight" delivery is suggested as the package is delivered directly to the DOT Headquarters Building located at 16 Child Street in Augusta. Other means, such as U.S. Postal Service's Express Mail has proven not to be reliable.

IN ADDITION, FOR FEDERAL AID PROJECTS:

6. Complete the DBE Proposed Utilization form, and submit with your bid. If you are submitting your bid electronically, you must FAX the form to (207) 624-3431. This is a curable defect.

*If you need further information regarding Bid preparation, call the DOT
Contracts Section at (207) 624-3410.*

*For complete bidding requirements, refer to Section 102 of the Maine Department
of Transportation, Standard Specifications, November 2014 Edition.*

NOTICE

The Maine Department of Transportation is attempting to improve the way Bid Amendments/Addendums are handled, and allow for an electronic downloading of bid packages from our website, while continuing to maintain an optional plan holders list.

Prospective bidders, subcontractors or suppliers who wish to download a copy of the bid package and receive a courtesy notification of project specific bid amendments must fill out the on-line plan holder registration form and provide an email address to the MDOT Contracts mailbox at: MDOT.contracts@maine.gov. Each bid package will require a separate request.

Additionally, interested parties will be responsible for reviewing and retrieving the Bid Amendments from our web site, and acknowledging receipt and incorporating those Bid Amendments in their bids using the Acknowledgement of Bid Amendment Form.

The downloading of bid packages from the MDOT website is not the same as providing an electronic bid to the Department. Electronic bids must be submitted via <http://www.BIDX.com>. For information on electronic bidding contact Patrick Corum at patrick.corum@maine.gov , Rebecca Snowden at rebecca.snowden@maine.gov or Diane Barnes at diane.barnes@maine.gov.

NOTICE

For security and other reasons, all Bid Packages which are mailed, shall be provided in double (one envelope inside the other) envelopes. The *Inner Envelope* shall have the following information provided on it:

Bid Enclosed - Do Not Open

PIN:

Town:

Date of Bid Opening:

Name of Contractor with mailing address and telephone number:

In Addition to the usual address information, the *Outer Envelope* should have written or typed on it:

Double Envelope: Bid Enclosed

PIN:

Town:

Date of Bid Opening:

Name of Contractor:

This should not be much of a change for those of you who use Federal Express or similar services.

Hand-carried Bids may be in one envelope as before, and should be marked with the following information:

Bid Enclosed: Do Not Open

PIN:

Town:

Name of Contractor:

October 16, 2001

STATE OF MAINE DEPARTMENT OF TRANSPORTATION
Bid Guaranty-Bid Bond Form

KNOW ALL MEN BY THESE PRESENTS THAT _____

_____, of the City/Town of _____ and State of _____

as Principal, and _____ as Surety, a

Corporation duly organized under the laws of the State of _____ and having a usual place of

Business in _____ and hereby held and firmly bound unto the Treasurer of

the State of Maine in the sum of _____ for payment which Principal and Surety bind

themselves, their heirs, executors, administrators, successors and assigns, jointly and severally.

The condition of this obligation is that the Principal has submitted to the Maine Department of

Transportation, hereafter Department, a certain bid, attached hereto and incorporated as a

part herein, to enter into a written contract for the construction of _____

_____ and if the Department shall accept said bid

and the Principal shall execute and deliver a contract in the form attached hereto (properly

completed in accordance with said bid) and shall furnish bonds for this faithful performance of

said contract, and for the payment of all persons performing labor or furnishing material in

connection therewith, and shall in all other respects perform the agreement created by the

acceptance of said bid, then this obligation shall be null and void; otherwise it shall remain in full

force, and effect.

Signed and sealed this _____ day of _____ 20_____

WITNESS:

WITNESS

PRINCIPAL:

By _____

By: _____

By: _____

SURETY:

By _____

By: _____

Name of Local Agency: _____

NOTICE

Bidders:

Please use the attached “Request for Information” form when submitting questions concerning specific Contracts that have been advertised for Bid, include additional numbered pages as required. RFI’s may be faxed to 207-624-3431, submitted electronically through the Departments web page of advertised projects by selecting the RFI tab on the project details page or via e-mail to RFI-Contracts.MDOT@maine.gov.

These are the only allowable mechanisms for answering Project specific questions. Maine DOT will not be bound to any answers to Project specific questions received during the Bidding phase through other processes.

When submitting RFIs by Email please follow the same guidelines as stated on the “Request for Information” form and include the word “RFI” along with the Project name and Identification number in the subject line.

NOTICE

Disadvantaged Business Enterprise Proposed Utilization

The Apparent Low Bidder shall submit the Disadvantaged Business Enterprise Proposed Utilization form with their bid. This is a curable bid defect.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form contains additional information that is required by USDOT.

The Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan form should be used.

A copy of the new Contractor's Disadvantaged Business Enterprise Proposed Utilization Plan and instructions for completing it are attached.

Note: Questions about DBE firms, or to obtain a printed copy of the DBE Directory, contact The Office of Civil Rights at (207) 624-3066.

MDOT's DBE Directory of Certified firms can also be obtained at <http://www.maine.gov/mdot/civilrights/dbe.htm>

INSTRUCTIONS FOR PREPARING THE MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR UTILIZATION FORM

The Contractor Shall Extend equal opportunity to MaineDOT certified DBE firms (as listed in MaineDOT's DBE Directory of Certified Businesses) in the selection and utilization of Subcontractors and Suppliers.

SPECIFIC INSTRUCTIONS FOR COMPLETING THE FORM:

Insert Contractor name, the name of the person(s) preparing the form, and that person(s) telephone, fax number and e-mail address.

Calculate and provide percentage of your bid that will be allocated to DBE firms, Federal Project Identification Number, and location of the Project work.

In the columns, name each subcontractor, DBE and non-DBE firm to be used, provide the Unit/Item cost of the work/product to be provided by the subcontractor, give a brief description and the dollar value of the work.

Revised 1/12

FHWA DBE GOAL NOTICE FFY 2013-15
Maine Department of Transportation
Disadvantaged Business Enterprise Program

Notice is hereby given that in accordance with US DOT regulation 49 CFR Part 26, the Maine Department of Transportation has established a DBE Program for disadvantaged business participation in the federal-aid highway and bridge construction program; MaineDOT contracts covered by the program include consulting, construction, supplies, manufacturing, and service contracts.

For FFY 2013-15 (October 1, 2012 through September 30, 2015) MaineDOT has established an annual DBE participation goal of **4.0%** to be achieved through race/gender neutral means. This goal has been approved by the Federal Highway Administration and remains in effect through September 30, 2015. Maine DOT must meet this goal each federal fiscal year. If the goal is not met, MaineDOT must provide a justification for not meeting the goal and provide a plan to ensure the goal is met, which may include contract goals on certain projects that contractors will be required to meet.

MaineDOT asks all contractors, consultants and subcontractors to seek certified DBE firms for projects and to work to meet the determined 4.0% goal without the need to impose contract goals. DBE firms are listed on the MaineDOT website at:

<http://www.maine.gov/mdot/civilrights/dbe.htm>

Interested parties may view MaineDOT's DBE goal setting methodology also posted on this website. If you have questions regarding this goal or the DBE program you may contact Sherry Tompkins at the Maine Department of Transportation, Civil Rights Office by telephone at (207) 624-3066 or by e-mail at: sherry.tompkins@maine.gov

**MaineDOT CONTRACTOR'S DBE/SUBCONTRACTOR
PROPOSED UTILIZATION FORM**

All Bidders must furnish this form with their bid on Bid Opening day

Contractor: _____ **Telephone:** _____ **Ext** _____

Contact Person: _____ **Fax:** _____

E-mail: _____

BID DATE: _____

FEDERAL PROJECT PIN # _____ **PROJECT LOCATION:** _____

TOTAL ANTICIPATED DBE ____ % PARTICIPATION FOR THIS CONTRACT

W B E	D B E	Non DBE	Firm Name	Item Number & Description of Work	Quantity	Cost Per Unit/Item	Anticipated \$ Value
Subcontractor Total >							
DBE Total >							

**NOTE: THIS INFORMATION IS USED TO TRACK AND REPORT ANTICIPATED DBE PARTICIPATION IN ALL
FEDERALLY FUNDED MAINE DOT CONTRACTS. THE ANTICIPATED DBE AMOUNT IS VOLUNTARY AND WILL
NOT BECOME A PART OF THE CONTRACTUAL TERMS.**

Equal Opportunity Use:

Form received: ___/___/___ Verified by: _____

FHWA FTA FAA

**For a complete list of certified firms and company designation (WBE/DBE) go to
<http://www.maine.gov/mdot>**

Rev. 05/13

Maine Department of Transportation Civil Rights Office

Directory of Certified Disadvantaged Business Enterprises

Listing can be found at:

<http://www.maine.gov/mdot/civilrights/dbe.htm>

For additional information and guidance contact:

Civil Rights Office at (207) 624-3066

It is the responsibility of the Contractor to access the DBE Directory at this site in order to have the most current listing.

Vendor Registration

Prospective Bidders must register as a vendor with the Department of Administrative & Financial Services if the vendor is awarded a contract. Vendors will not be able to receive payment without first being registered. Vendors/Contractors will find information and register through the following link –

<http://www.maine.gov/purchases/venbid/index.shtml>

**STATE OF MAINE DEPARTMENT OF TRANSPORTATION
NOTICE TO CONTRACTORS**

Sealed Bids addressed to the Maine Department of Transportation, Augusta, Maine 04333 and endorsed on the wrapper "Bids for **Statewide Airport Crack Sealing** in the towns/city of **Lincoln, Millinocket, Jackman, Pittsfield, and Waterville**" will be received from contractors at the Reception Desk, Maine DOT Building, Capitol Street, Augusta, Maine, until 11:00 o'clock A.M. (prevailing time) on April 29, 2015 and at that time and place publicly opened and read. Bids will be accepted from all bidders. The lowest responsive bidder must demonstrate successful completion of projects of similar size and scope to be considered for the award of this contract. **We now accept electronic bids for those bid packages posted on the bidx.com website. Electronic bids do not have to be accompanied by paper bids. Please note: the Department will accept a facsimile of the bid bond; however, the original bid bond must then be received at the MDOT Contract Section within 72 hours of the bid opening. Until further notice, dual bids (one paper, one electronic) will be accepted, with the paper copy taking precedence.**

Description: FAA WIN. 018717.00

Location: In Kennebec, Penobscot, and Somerset Counties, project is located at five various airport locations as shown in the contract documents.

Outline of Work: Crack Sealing and other incidental work.

For general information regarding Bidding and Contracting procedures, contact George Macdougall at (207) 624-3410. Our webpage at <http://www.maine.gov/mdot/contractors/> contains a copy of the Schedule of Items, Plan Holders List, written portions of bid amendments, drawings, bid results and an electronic form for RFI submittal. For Project-specific information fax all questions to **Project Manager** Tim LeSiege at (207) 624-3431, use electronic RFI form or email questions to RFI-Contracts.MDOT@maine.gov, project name and identification number should be in the subject line. Questions received after 12:00 noon of Monday prior to bid date will not be answered. Bidders shall not contact any other Departmental staff for clarification of Contract provisions, and the Department will not be responsible for any interpretations so obtained. TTY users call Maine Relay 711.

Plans, specifications and bid forms may be seen at the Maine DOT Building in Augusta, Maine. They may be purchased from the Department between the hours of 8:00 a.m. to 4:30 p.m. by cash, credit card (Visa/Mastercard) or check payable to Treasurer, State of Maine sent to Maine Department of Transportation, Attn.: Mailroom, 16 State House Station, Augusta, Maine 04333-0016. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Full size plans \$7.00 (\$10.50 by mail). Half size plans \$3.50 (\$5.75 by mail), Bid Book \$10 (\$13 by mail), Single Sheets \$2, payment in advance, all non-refundable.

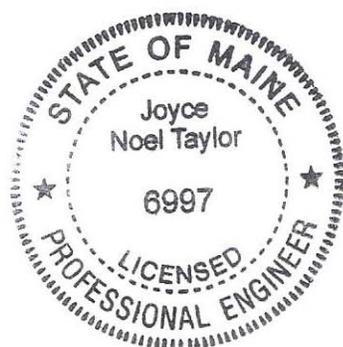
Each Bid must be made upon blank forms provided by the Department and must be accompanied by a bid bond at 5% of the bid amount or an official bank check, cashier's check, certified check, certificate of deposit, or United States postal money order in the amount of \$12,000.00 payable to Treasurer, State of Maine as a Bid guarantee. A Contract Performance Surety Bond and a Contract Payment Surety Bond, each in the amount of 100 percent of the Contract price, will be required of the successful Bidder.

This Contract is subject to all applicable Federal Laws. This contract is subject to compliance with the Disadvantaged Business Enterprise program requirements as set forth by the Maine Department of Transportation.

All work shall be governed by "State of Maine, Department of Transportation, Standard Specifications, November 2014 Edition", price \$10 [\$15 by mail], and Standard Details, November 2014 Edition, price \$10 [\$15 by mail]. They also may be purchased by telephone at (207) 624-3536 between the hours of 8:00 a.m. to 4:30 p.m. Standard Detail updates can be found at <http://www.maine.gov/mdot/contractors/publications/>.

The right is hereby reserved to the Maine DOT to reject any or all bids.

Augusta, Maine
April 15, 2015




JOYCE NOEL TAYLOR P. E.
CHIEF ENGINEER

NOTICE

All bids for Federal Projects **shall** be accompanied by the DBE Proposed Utilization form. If you are submitting an electronic bid, the DBE Utilization Form may be faxed to 207-624-3431. Failure to submit the form with the bid will be considered a curable defect.

SPECIAL PROVISION 102.7.3
ACKNOWLEDGMENT OF BID AMENDMENTS

With this form, the Bidder acknowledges its responsibility to check for all Amendments to the Bid Package. For each Project under Advertisement, Amendments are located at <http://www.maine.gov/mdot/contractors/> . It is the responsibility of the Bidder to determine if there are Amendments to the Project, to download them, to incorporate them into their Bid Package, and to reference the Amendment number and the date on the form below. The Maine DOT will not post Bid Amendments any later than noon the day before Bid opening without individually notifying all the planholders.

Amendment Number	Date

The Contractor, for itself, its successors and assigns, hereby acknowledges that it has received all of the above referenced Amendments to the Bid Package.

CONTRACTOR

Date

Signature of authorized representative

(Name and Title Printed)

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 018717.00

Project(s): 018717.00

SECTION: 1 PROJECT ITEMS

Alt Set ID: Alt Mbr ID:

Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0010	424.302 CRACK SEALER, APPLIED LINCOLN	941.000 G	_____	 _____	_____	 _____
0020	424.302 CRACK SEALER, APPLIED MILLINOCKET	2,049.000 G	_____	 _____	_____	 _____
0030	424.302 CRACK SEALER, APPLIED PITTSFIELD	620.000 G	_____	 _____	_____	 _____
0040	424.302 CRACK SEALER, APPLIED JACKMAN	156.000 G	_____	 _____	_____	 _____
0050	424.302 CRACK SEALER, APPLIED WATERVILLE	1,518.000 G	_____	 _____	_____	 _____
0060	620.511 RUNWAY AND TAXIWAY MARKING REMOVE LINCOLN	17,500.000 SF	_____	 _____	_____	 _____
0070	620.511 RUNWAY AND TAXIWAY MARKING REMOVE MILLINOCKET	36,212.000 SF	_____	 _____	_____	 _____
0080	620.511 RUNWAY AND TAXIWAY MARKING REMOVE PITTSFIELD	46,200.000 SF	_____	 _____	_____	 _____
0090	620.511 RUNWAY AND TAXIWAY MARKING REMOVE JACKMAN	4,500.000 SF	_____	 _____	_____	 _____
0100	620.511 RUNWAY AND TAXIWAY MARKING REMOVE WATERVILLE	13,700.000 SF	_____	 _____	_____	 _____
0110	620.512 RUNWAY AND TAXIWAY MARKING JACKMAN	4,500.000 SF	_____	 _____	_____	 _____

Maine Department of Transportation

Proposal Schedule of Items

Proposal ID: 018717.00

Project(s): 018717.00

SECTION: 1 PROJECT ITEMS

Alt Set ID: Alt Mbr ID:

Contractor: _____

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price		Bid Amount	
			Dollars	Cents	Dollars	Cents
0120	620.512 RUNWAY AND TAXIWAY MARKING LINCOLN	17,500.000 SF	_____	 _____	_____	 _____
0130	620.512 RUNWAY AND TAXIWAY MARKING MILLINOCKET	36,212.000 SF	_____	 _____	_____	 _____
0140	620.512 RUNWAY AND TAXIWAY MARKING PITTSFIELD	46,200.000 SF	_____	 _____	_____	 _____
0150	620.512 RUNWAY AND TAXIWAY MARKING WATERVILLE	5,200.000 SF	_____	 _____	_____	 _____
0160	620.513 REFLECTIVE MEDIA JACKMAN	391.000 LB	_____	 _____	_____	 _____
0170	620.513 REFLECTIVE MEDIA LINCOLN	1,522.000 LB	_____	 _____	_____	 _____
0180	620.513 REFLECTIVE MEDIA MILLINOCKET	3,149.000 LB	_____	 _____	_____	 _____
0190	620.513 REFLECTIVE MEDIA PITTSFIELD	4,017.000 LB	_____	 _____	_____	 _____
0200	620.513 REFLECTIVE MEDIA WATERVILLE	455.000 LB	_____	 _____	_____	 _____
0210	659.10 MOBILIZATION	LUMP SUM		LUMP SUM	_____	 _____
Section: 1			Total:		_____	 _____
			Total Bid:		_____	 _____

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____ a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, WIN. 18717.00 for Statewide Airport Crack Sealing in the towns/city of Jackman, Lincoln, Millinocket, Pittsfield and Waterville, Counties of Somerset, Penobscot and Kennebec, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before September 1, 2015. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

\$_____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

Statewide Airport Crack Sealing - in the towns of Jackman, Lincoln, Millinocket, Pittsfield and Waterville.

State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached “Schedule of Items”.

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached “Schedule of Items” in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached “Schedule of Items”, which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

Date

(Signature of Legally Authorized Representative
of the Contractor)

Witness

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: David Bernhardt, Commissioner

Witness

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street, Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and

_____ a corporation or other legal entity organized under the laws of the State of _____, with its principal place of business located at _____

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, WIN. 18717.00 for **Statewide Airport Crack Sealing** in the towns/city of **Jackman, Lincoln, Millinocket, Pittsfield and Waterville**, Counties of **Somerset, Penobscot and Kennebec**, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before **September 1, 2015**. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is _____

\$_____ Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in the Federal Contract Provisions Supplement, and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications November 2014 Edition, Standard Details November 2014 Edition as updated through advertisement, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

Statewide Airport Crack Sealing - in the towns of Jackman, Lincoln, Millinocket, Pittsfield and Waterville.

State of Maine, on which bids will be received until the time specified in the “Notice to Contractors” do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached “Schedule of Items”.

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached “Schedule of Items” in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached “Schedule of Items”, which may be ordered by the Resident, and to accept as full compensation the amount determined upon a “Force Account” basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier’s check, certificate of deposit or U. S. Postal Money Order in the amount given in the “Notice to Contractors”, payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor’s Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR

Date

(Signature of Legally Authorized Representative
of the Contractor)

Witness

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: David Bernhardt, Commissioner

Witness

CONTRACT AGREEMENT, OFFER & AWARD

AGREEMENT made on the date last signed below, by and between the State of Maine, acting through and by its Department of Transportation (Department), an agency of state government with its principal administrative offices located at Child Street Augusta, Maine, with a mailing address at 16 State House Station, Augusta, Maine 04333-0016, and (Name of the firm bidding the job) a corporation or other legal entity organized under the laws of the State of Maine, with its principal place of business located at (address of the firm bidding the job)

The Department and the Contractor, in consideration of the mutual promises set forth in this Agreement (the "Contract"), hereby agree as follows:

A. The Work.

The Contractor agrees to complete all Work as specified or indicated in the Contract including Extra Work in conformity with the Contract, PIN No. 1224.00, for the Hot Mix Asphalt Overlay in the town/city of South Nowhere, County of Washington, Maine. The Work includes construction, maintenance during construction, warranty as provided in the Contract, and other incidental work.

The Contractor shall be responsible for furnishing all supervision, labor, equipment, tools supplies, permanent materials and temporary materials required to perform the Work including construction quality control including inspection, testing and documentation, all required documentation at the conclusion of the project, warranting its work and performing all other work indicated in the Contract.

The Department shall have the right to alter the nature and extent of the Work as provided in the Contract; payment to be made as provided in the same.

B. Time.

The Contractor agrees to complete all Work, except warranty work, on or before November 15, 2006. Further, the Department may deduct from moneys otherwise due the Contractor, not as a penalty, but as Liquidated Damages in accordance with Sections 107.7 and 107.8 of the State of Maine Department of Transportation Standard Specifications, November 2014 Edition and related Special Provisions.

C. Price.

The quantities given in the Schedule of Items of the Bid Package will be used as the basis for determining the original Contract amount and for determining the amounts of the required Performance Surety Bond and Payment Surety Bond, and that the amount of this offer is (Place bid here in alphabetical form such as One Hundred and Two dollars and 10 cents)
\$ (repeat bid here in numerical terms, such as \$102.10) Performance Bond and Payment Bond each being 100% of the amount of this Contract.

D. Contract.

This Contract, which may be amended, modified, or supplemented in writing only, consists of the Contract documents as defined in the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition, Supplemental Specifications, Special Provisions, Contract Agreement, and Contract Bonds. It is agreed and understood that this Contract will be governed by the documents listed above.

E. Certifications.

By signing below, the Contractor hereby certifies that to the best of the Contractor's knowledge and belief:

1. All of the statements, representations, covenants, and/or certifications required or set forth in the Bid and the Bid Documents, including those in Appendix A to Division 100 of the Standard Specifications November 2014 Edition (Federal Contract Provisions Supplement), and the Contract are still complete and accurate as of the date of this Agreement.
2. The Contractor knows of no legal, contractual, or financial impediment to entering into this Contract.
3. The person signing below is legally authorized by the Contractor to sign this Contract on behalf of the Contractor and to legally bind the Contractor to the terms of the Contract.

F. Offer.

The undersigned, having carefully examined the site of work, the Plans, Standard Specifications, November 2014 Edition, Standard Details November 2014 Edition, Supplemental Specifications, Special Provisions, Contract Agreement; and Contract Bonds contained herein for construction of:

PIN 1234.00 South Nowhere, Hot Mix Asphalt Overlay,

State of Maine, on which bids will be received until the time specified in the "Notice to Contractors" do(es) hereby bid and offer to enter into this contract to supply all the materials, tools, equipment and labor to construct the whole of the Work in strict accordance with the terms and conditions of this Contract at the unit prices in the attached "Schedule of Items".

The Offeror agrees to perform the work required at the price specified above and in accordance with the bids provided in the attached "Schedule of Items" in strict accordance with the terms of this solicitation, and to provide the appropriate insurance and bonds if this offer is accepted by the Government in writing.

As Offeror also agrees:

First: To do any extra work, not covered by the attached "Schedule of Items", which may be ordered by the Resident, and to accept as full compensation the amount determined upon a "Force Account" basis as provided in the Standard Specifications, November 2014 Edition, and as addressed in the contract documents.

Second: That the bid bond at 5% of the bid amount or the official bank check, cashier's check, certificate of deposit or U. S. Postal Money Order in the amount given in the "Notice to Contractors", payable to the Treasurer of the State of Maine and accompanying this bid, shall be forfeited, as liquidated damages, if in case this bid is accepted, and the undersigned shall fail to abide by the terms and conditions of the offer and fail to furnish satisfactory insurance and Contract bonds under the conditions stipulated in the Specifications within 15 days of notice of intent to award the contract.

Third: To begin the Work as stated in Section 107.2 of the Standard Specifications November 2014 Edition and complete the Work within the time limits given in the Special Provisions of this Contract.

Fourth: The Contractor will be bound to the Disadvantaged Business Enterprise (DBE) Requirements contained in the attached Notice (Additional Instructions to Bidders) and submit a completed Contractor's Disadvantaged Business Enterprise Utilization Plan with their bid.

Fifth: That this offer shall remain open for 30 calendar days after the date of opening of bids.

Sixth: The Bidder hereby certifies, to the best of its knowledge and belief that: the Bidder has not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of competitive bidding in connection with its bid, and its subsequent contract with the Department.

IN WITNESS WHEREOF, the Contractor, for itself, its successors and assigns, hereby execute two duplicate originals of this Agreement and thereby binds itself to all covenants, terms, and obligations contained in the Contract Documents.

CONTRACTOR
(Sign Here)

(Signature of Legally Authorized Representative
of the Contractor)

(Witness Sign Here)

Witness

(Print Name Here)

(Name and Title Printed)

G. Award.

Your offer is hereby accepted.
documents referenced herein.

This award consummates the Contract, and the

MAINE DEPARTMENT OF TRANSPORTATION

Date

By: David Bernhardt, Commissioner

(Witness)

BOND # _____

CONTRACT PERFORMANCE BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____
_____ in the State of _____, as principal,
and.....
a corporation duly organized under the laws of the State of and having a
usual place of business
as Surety, are held and firmly bound unto the Treasurer of the State of Maine in the sum
of _____ and 00/100 Dollars (\$ _____),
to be paid said Treasurer of the State of Maine or his successors in office, for which
payment well and truly to be made, Principal and Surety bind themselves, their heirs,
executors and administrators, successors and assigns, jointly and severally by these
presents.

The condition of this obligation is such that if the Principal designated as Contractor in
the Contract to construct Project Number _____ in the Municipality of
_____ promptly and faithfully performs the Contract, then this
obligation shall be null and void; otherwise it shall remain in full force and effect.

The Surety hereby waives notice of any alteration or extension of time made by the State
of Maine.

Signed and sealed this day of, 20.....

WITNESSES:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY:

Signature

.....

Print Name Legibly

Print Name Legibly

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....
.....
.....

ADDRESS
.....
.....

TELEPHONE.....

.....

BOND # _____

CONTRACT PAYMENT BOND
(Surety Company Form)

KNOW ALL MEN BY THESE PRESENTS: That _____
_____ **in the State of** _____, as principal,
and.....
a corporation duly organized under the laws of the State of and having a
usual place of business in
as Surety, are held and firmly bound unto the Treasurer of the State of Maine for the use
and benefit of claimants as herein below defined, in the sum of
_____ **and 00/100 Dollars (\$** _____ **)**
for the payment whereof Principal and Surety bind themselves, their heirs, executors and
administrators, successors and assigns, jointly and severally by these presents.

The condition of this obligation is such that if the Principal designated as Contractor in
the Contract to construct Project Number _____ in the Municipality of
_____ promptly satisfies all claims and demands incurred for all
labor and material, used or required by him in connection with the work contemplated by
said Contract, and fully reimburses the obligee for all outlay and expense which the
obligee may incur in making good any default of said Principal, then this obligation shall
be null and void; otherwise it shall remain in full force and effect.

A claimant is defined as one having a direct contract with the Principal or with a
Subcontractor of the Principal for labor, material or both, used or reasonably required for
use in the performance of the contract.

Signed and sealed this day of, 20

WITNESS:

SIGNATURES:

CONTRACTOR:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY:

Signature.....

.....

Print Name Legibly

Print Name Legibly

SURETY ADDRESS:

NAME OF LOCAL AGENCY:

.....

ADDRESS

.....

.....

TELEPHONE

.....

General Decision Number: ME150046 01/02/2015 ME46

Superseded General Decision Number: ME20140046

State: Maine

Construction Type: Highway

County: Somerset County in Maine.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015

* ENGI0004-014 04/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Bobcat/Skid Steer/Skid Loader, Mechanic.....	\$ 20.75	10.84

SUME2011-041 09/14/2011		

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 18.34	2.84
INSTALLER - GUARDRAIL.....	\$ 11.53	1.55
IRONWORKER, REINFORCING.....	\$ 18.71	0.00
LABORER: Asphalt Raker.....	\$ 13.91	2.94
LABORER: Flagger.....	\$ 9.00	0.00
LABORER: Landscape.....	\$ 13.30	0.16
LABORER: Pipelayer.....	\$ 13.21	1.58
LABORER: Wheelman.....	\$ 13.81	1.47

LABORER: Common or General, Including Highway/Parking Lot Striping.....	\$ 12.05	1.38
OPERATOR: Asphalt Roller.....	\$ 18.92	7.24
OPERATOR: Backhoe.....	\$ 16.18	4.98
OPERATOR: Bulldozer.....	\$ 12.63	2.88
OPERATOR: Cold Planer.....	\$ 17.63	0.00
OPERATOR: Crane.....	\$ 21.21	6.19
OPERATOR: Excavator.....	\$ 15.41	3.86
OPERATOR: Grader/Blade.....	\$ 17.26	2.73
OPERATOR: Loader.....	\$ 15.69	2.87
OPERATOR: Milling Machine Reclaimer Combo.....	\$ 13.00	0.80
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 21.49	5.20
OPERATOR: Screed.....	\$ 16.00	0.00
OPERATOR: Roller (Earth).....	\$ 11.55	1.72
TRUCK DRIVER, Includes All Dump Trucks.....	\$ 12.60	5.82
TRUCK DRIVER: Lowboy Truck.....	\$ 12.35	0.00
TRUCK DRIVER: Semi-Trailer Truck.....	\$ 16.36	9.09
TRUCK DRIVER: 1, 2, 3 Axle Truck.....	\$ 12.40	2.19

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage

determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current

negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

General Decision Number: ME150051 01/02/2015 ME51

Superseded General Decision Number: ME20140051

State: Maine

Construction Type: Highway

County: Penobscot County in Maine.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Note: Executive Order (EO) 13658 establishes an hourly minimum wage of \$10.10 for 2015 that applies to all contracts subject to the Davis-Bacon Act for which the solicitation is issued on or after January 1, 2015. If this contract is covered by the EO, the contractor must pay all workers in any classification listed on this wage determination at least \$10.10 (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract. The EO minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under the EO is available at www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/02/2015

* ENGI0004-013 04/01/2014

	Rates	Fringes
POWER EQUIPMENT OPERATOR:		
Grader/ Blade, Milling Machine.....	\$ 20.75	10.84

SUME2011-046 09/14/2011		

	Rates	Fringes
CARPENTER, Includes Form Work....	\$ 14.72	1.72
CEMENT MASON/CONCRETE FINISHER...	\$ 16.94	0.00
ELECTRICIAN.....	\$ 21.55	3.51
IRONWORKER, REINFORCING.....	\$ 17.45	0.00
IRONWORKER, STRUCTURAL.....	\$ 18.75	4.56
LABORER: Common or General.....	\$ 12.83	2.20
LABORER: Flagger.....	\$ 9.00	0.00
LABORER: Highway/Parking Lot Striping.....	\$ 14.63	0.00

LABORER: Landscape.....	\$ 15.43	2.09
OPERATOR: Backhoe.....	\$ 17.27	3.45
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 16.21	4.60
OPERATOR: Broom/Sweeper.....	\$ 13.49	1.22
OPERATOR: Bulldozer.....	\$ 17.74	2.72
OPERATOR: Crane.....	\$ 19.03	1.70
OPERATOR: Excavator.....	\$ 16.33	2.78
OPERATOR: Loader.....	\$ 15.66	4.79
OPERATOR: Mechanic.....	\$ 21.71	6.29
OPERATOR: Milling Machine Reclaimer Combo.....	\$ 24.77	8.39
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 19.89	7.20
OPERATOR: Roller excluding Asphalt.....	\$ 19.97	7.43
OPERATOR: Screed.....	\$ 19.58	5.95
TRUCK DRIVER, Includes all axles including Dump Trucks.....	\$ 12.31	4.44
TRUCK DRIVER: Lowboy Truck.....	\$ 15.15	5.62

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

=====
END OF GENERAL DECISION

OPERATOR: Backhoe.....	\$ 14.51	2.95
OPERATOR: Bobcat/Skid Steer/Skid Loader.....	\$ 16.73	5.57
OPERATOR: Bulldozer.....	\$ 16.95	1.94
OPERATOR: Cold Planer.....	\$ 17.63	0.00
OPERATOR: Crane.....	\$ 20.99	6.40
OPERATOR: Excavator.....	\$ 17.33	3.67
OPERATOR: Grader/Blade.....	\$ 18.63	3.29
OPERATOR: Loader.....	\$ 15.36	2.33
OPERATOR: Mechanic.....	\$ 19.30	7.60
OPERATOR: Milling Machine Reclaimer Combo.....	\$ 13.00	0.80
OPERATOR: Paver (Asphalt, Aggregate, and Concrete).....	\$ 20.29	8.12
OPERATOR: Screed.....	\$ 16.92	5.36
OPERATOR: Roller (Earth).....	\$ 15.74	2.47
TRAFFIC CONTROL: LABORER -Device Monitor.....	\$ 13.79	0.00
TRUCK DRIVER, Includes All Dump Trucks.....	\$ 12.71	2.27
TRUCK DRIVER: Semi-Trailer Truck.....	\$ 16.36	9.09
TRUCK DRIVER: 1, 2, 3 Axle Truck.....	\$ 15.00	5.71

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the

cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

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Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of

each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

SPECIAL PROVISION
SECTION 104
GENERAL RIGHTS AND RESPONSIBILITIES
(Electronic Payroll Submission)
(Payment Tracking)

104.3.8.1 Electronic Payroll Submission The prime contractor and all subcontractors and lower-tier subcontractors will submit their certified payrolls electronically on this contract utilizing the Elation System web based reporting. There is no charge to the contracting community for the use of this service. The submission of paper payrolls will not be allowed or accepted. Additional information can be found at <http://www.maine.gov/mdot/comprehensive-list-projects/project-information.php> under the first “Notice”.

104.3.8.2 Payment Tracking The prime contractor and all subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System

SPECIAL PROVISION 105
GENERAL SCOPE OF WORK
Equal Opportunity and Civil Rights
(Disadvantaged Business Enterprises Program)

105.10.1.1 Disadvantaged Business Enterprises Program The Maine Department of Transportation (MaineDOT) has established a Disadvantaged Business Enterprise (DBE) program in accordance with regulations of the United States Department of Transportation (USDOT), 49 CFR Part 26. The MaineDOT receives federal financial assistance from USDOT, and as a condition of receiving this assistance, the Department has signed an assurance that it will comply with 49 CFR Part 26. The MaineDOT is responsible for determining the eligibility of and certifying DBE firms in Maine.

A DBE is defined as a for-profit business that is owned and controlled by one or more socially and economically disadvantaged person(s). For the purpose of this definition:

1. "Socially and economically disadvantaged person" means an individual who is a citizen or lawful permanent resident of the United States and who is Black, Hispanic, Native American, Asian, Female; or a member of another group or an individual found to be disadvantaged by the Small Business Administration pursuant to Section 3 of the Small Business Act.
2. "Owned and controlled" means a business which is:
 - a. A sole proprietorship legitimately owned and controlled by an individual who is a disadvantaged person.
 - b. A partnership or limited liability company in which at least 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).
 - c. A corporation or other entity in which at least 51% of the voting interest and 51% of the beneficial ownership interests legitimately are held by a disadvantaged person(s).

The disadvantaged group owner(s) or stockholder(s) must possess control over management, interest in capital, and interest in earnings commensurate with the percentage of ownership. If the disadvantaged group ownership interests are real, substantial and continuing and not created solely to meet the requirements of this program, a firm is considered a bona fide DBE.

105.10.1.2 Commercially Useful Function MaineDOT will count expenditures of a DBE contractor toward DBE goals only if the DBE is performing a commercially useful function on that contract. A DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. Credit will only be given when the DBE meets all conditions for a CUF. Credit for labor will be in accordance with the responsibilities outlined in the contract. To perform a commercially useful function, the DBE must also be responsible, with respect to materials and supplies used on the Contract, for negotiating price, determining quality and quantity, ordering the materials, and installing (where applicable) and paying for the material itself. To determine whether a DBE is performing a commercially useful function, MaineDOT will evaluate the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and DBE credit claimed for its performance of the work, and other relevant factors.

Rented equipment used by the DBE must not be rented from the Prime Contractor on a job that the DBE is subcontracted with that Prime Contractor for regular course of business.

A current listing of certified DBEs that may wish to participate in the highway construction program and the scope of work for which they are certified can be found at <http://www.maine.gov/mdot/disadvantaged-business-enterprises/pdf/directory.pdf>. Credit will be given for the value described by a DBE performing as:

- A. A prime contractor; 100% of actual value of work performed by own workforces.
- B. An approved subcontractor; 100% of work performed by own workforces.
- C. An owner-operator of construction equipment; 100% of expenditures committed.
- D. A manufacturer; 100% of expenditures committed. The manufacturer must be a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Contractor. Brokers and packagers shall not be regarded as manufacturers.
- E. A regular dealer; 60% of expenditures committed. A regular dealer is defined as a firm that owns, operates, or maintains a store, warehouse or other establishment in which the materials or supplies required for the performance of the contract are bought, kept in stock, and regularly sold to the public. For purposes of this provision a "Broker" is a DBE that has entered into a legally binding relationship to provide goods or services delivered or performed by a third party. Brokers and packagers shall not be regarded as regular dealers.
- F. A bona fide service provider; 100% of reasonable fees or commissions. Eligible services include professional, technical, consultant, or managerial, services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for the performance of the contract. Eligible services also include agencies providing bonding and insurance specifically required for the performance of the contract.
- G. A trucking, hauling or delivery operation. 100% of expenditures committed when trucks are owned, operated, licensed and insured by the DBE and used on the contract and, if applicable, includes the cost of the self supplied materials and supplies. 100% of expenditures committed when the DBE leases trucks from another DBE firm including an owner-operator. 100% of reasonable fees or commissions the DBE receives as a result of a lease arrangement for trucks from a non-DBE, including an owner-operator.
- H. Any combination of the above.

105.10.1.3 Race-neutral Goals The Maine DOT is required to set an annual goal (approved on a three year basis) for DBE participation in Federal-aid projects. In order to fulfill that goal, bidders are encouraged to utilize DBE businesses certified by the MaineDOT. MaineDOT seeks to meet the established DBE goal solely through race-neutral means. *Race-neutral* DBE participation occurs when a DBE is awarded a prime contract through customary competitive procurement procedures, is awarded a subcontract on a contract that does not carry a DBE contract goal, or wins a subcontract from a prime contractor that did not consider its DBE status in making the award. A DBE/subcontractor Utilization Proposed Form is required to be included in bid documents.

MaineDOT will analyze each project and create a Project Availability Target (PAT), based on a number of factors including project scope, available DBE firms, firms certified in particular project work, etc. Each bid will request that the contractor attempt to meet the PAT. This PAT is developed to assist contractors to better understand what the MaineDOT expectations are for a

specific project. The PAT is NOT a mandate but an assessment of what this particular project can bear for DBE participation. The Department anticipates that each contractor will make the best effort to reach or exceed this PAT for the project.

105.10.1.4 Race-conscious Project Goals If it is determined by the Department that the annual DBE goal will not be met through *race-neutral* means, the Department may implement *race-conscious contract goals* on some projects. Race-conscious contract goals are goals that are enforceable by the Department and require that the prime contractor use good faith effort to achieve the goal set by the Department for that particular project. If race conscious means are implemented on a project, the Prime must comply with the requirements of 49 CFR.

At the time of the bid opening, all Bidders shall submit with their bid a Disadvantaged Business Enterprise (DBE) Commitment Form provided by the Department. This form will list the DBE and non-DBE firms that are proposed to be used during the execution of the Work. The list shall show the name of the firm, the item/material/type of work involved and the dollar amount of work to be performed. The dollar total of each commitment shall be totaled and a percentage determined.

If the project goal is not met, acceptable documentation showing all good faith efforts made to obtain participation may be required in order to award the project. Failure to provide the required listing with the dollar participation total or acceptable documentation of good faith efforts to obtain DBE participation within 3 days after the bid opening date will be considered a lack of responsiveness on the part of the low bidder. Rejection of the low bid under these circumstances will require the low bidder to surrender the Proposal Guaranty to the Department. The submission and approval of the above forms does not constitute a formal subcontract.

If for any reason during the progress of the Work the Contractor finds that DBEs included on the list are unable to perform the proposed work, the Contractor, with written release by the committed DBE or approval of the Department, may substitute other DBE firms for those named on the list. If the Contractor is able to clearly document their inability to find qualified substitute firms to meet the project goal, the Contractor may request in writing approval to substitute the DBE with a non-DBE firm. If at any time during the life of the Contract it is determined that the Contractor is not fulfilling the goal or commitment(s) and is not making a good faith effort to fulfill the DBE requirement, the Department may withhold progress payments. If good faith effort is determined by the Department, failure to meet the DBE contract goal will not be a detriment to the bid award. Fulfillment of the goal percentage shall be determined by dividing the dollars committed to the DBEs by the actual contract dollars. These requirements are in addition to all other Equal Employment Opportunity requirements on Federal-aid contracts.

105.10.1.5 Certification of DBE attainment on Contracts The MaineDOT must certify that it has conducted post-award monitoring of all contracts to ensure that DBEs had done the work for which credit was claimed. The certification is for the purpose of ensuring accountability for monitoring which the regulation already requires. The MaineDOT will certify these contracts through review of CUF forms, Elations sub-contract payment tracking as well as occasional on-site reviews of projects and through the project's final closeout documentation provided by our Contracts Section.

105.10.1.6 Bidders' List Survey Pursuant to 49 CFR 26.11 the MaineDOT is required to “create and maintain” a bidders list and gather bidder information on our construction/consultant projects, Contractors will maintain information on all subcontract bids submitted by DBE and Non-DBE firms and provide that information to the Department. The Following information is required:

Firm Name

Firm Address

Firm status (DBE or non-DBE)

Age of firm (years)

And the annual gross receipts amount as indicated by defined brackets, i.e. \$500,000 to \$800,000, rather than requesting exact figures.

Not only is this information critical in determining the availability of DBE businesses relative to other businesses that do similar work, but the Federal Highway Administration requires that we obtain this information.

MaineDOT DBE Project Attainment Target (PAT)
for this Project is N/A

The MaineDOT seeks to meet the specified annual Disadvantaged Business Enterprise (DBE) usage goal set out by 49 CFR 26.45 through the efforts of contractors seeking to employ qualified DBE subcontractors. We seek to meet this goal by race neutral means and do not, at this time, use contract specific requirements for each project. We do however, understand the capacity of Maine's DBE community and the unique characteristics a project may have that would differ from the broad annual goal.

Taking this into consideration, the MaineDOT will review each project and develop an anticipated attainment or Project Attainment Target (PAT) based on several factors that are project specific. Those factors include:

- Scope of Work
- DBE availability according to Specification Item
- Geographic location
- DBE capacity

This PAT is developed to assist contractors to better understand the DBE participation that the MaineDOT can reasonably expect for a specific project. The PAT is NOT a mandate but an assessment of the DBE opportunities that this project could meet or exceed. MaineDOT anticipates that each contractor will make the best effort to reach or exceed the PAT for this project.

SPECIAL PROVISION
SECTION 107
TIME
(Contract Time)

The specified Contract Completion date is September 1, 2015.

SPECIAL PROVISION
SECTION 424
FIBER REINFORCED LOW MODULUS OR FIBER MODIFIED ASPHALT
CRACK SEALER

Description This work item shall consist of the furnishing and placement of resilient and adhesive crack sealant, hot-applied, capable of effectively sealing cracks in flexible (bituminous) pavements in accordance with these Special Provisions. Placement shall consist of: 1) crack cleaning and drying, 2) reheating of existing, usable crackseal material in situ, 3) material preparation and application, 4) material finishing and shaping and 5) material clean up.

Materials The sealant shall be either one of the following (A or B) and shall be subject to approval by the Resident prior to the start of work.

A) Fiber Reinforced Low Modulus Crack Sealant Material:

1. Low Modulus Crack Sealant Material shall conform to AASHTO M 324, Type IV (ASTM D 6690, Type IV) and the following specification.

Cone Penetration	90 – 150
Softening Point °C (°F) per ASTM D 36 minimum	80(176)
Flow @ 60°C [140°F]	< 3.0mm [1/8 in]
Bond, non-immersed	Three 12.7mm [1/2 in] Specimens pass ^A 3 cycles @ 200% extension @ -29°C [-20°F]
Resilience, %	60 min
Asphalt Compatibility, ASTM D5329	Pass ^B

^AThe Development at any time during the test procedure of a crack, separation, or other opening that at any point is over 6 mm deep in the sealant or between the sealant and concrete block shall constitute failure of the test specimen. The depth of the crack, separation, or other opening shall be measured perpendicular to the side of the sealant showing the defect.

^BThere shall be no failure in adhesion, formation of any oily exudate at the interface between the sealant and asphaltic concrete or other deleterious effects on the asphaltic concrete or sealant when tested at 60°C [140°F].

2. Fibers - Polyester, fully drawn.

Length	10 mm [0.4 in] (max)
Denier	15 dpf (max)

Tenacity	4 gpd (min)
Crimp	none
Color	natural

Fiber Reinforced Low Modulus Crack Sealant Material Properties:

Fiber concentration	0 to 5 % by weight of Low Modulus Crack Sealant Material; uniform dispersion of fibers
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Blending of the fibers with the low modulus crack sealant material shall be in accordance with the recommendations of the manufacturer of the fibers. The % of fibers to be added at the contractor’s discretion, with final adjustments and approval made by the Department.

B) Fiber Reinforced Modified Asphalt compound consisting of:

1. Modified Asphalt Binder - This shall consist of a blend of neat asphalt cement and crumb rubber, which are chemically bonded to produce a modified asphalt binder that complies with all the requirements of AASHTO MP1a for PG 70-34, with a separation less than 5% (AASHTO PP 5-93, Section 8.3). The modified asphalt binder shall not contain any particles of rubber or elastomeric material when tested in accordance with AASHTO T 44. The viscosity shall not exceed 3 Pa·s at 300°F. The dynamic shear of the pressure aging vessel residue shall not exceed 5000 kPa at 7°C. The elastic recovery at 4°C (AASHTO T301) shall be not less than 70%. The modification at a minimum shall consist of 5% crumb rubber from tires. The supplier of the modified asphalt binder shall certify the composition and PG grade of the modified asphalt binder.
2. Asphalt Cement - The high temperature grade (AASHTO MP1a) of the neat asphalt cement shall not exceed PG 58-XX.
3. Crumb Rubber – The modified asphalt binder shall have a crumb rubber content of not less than 5% by weight of neat asphalt cement. The maximum size of the crumb rubber shall be 80 mesh.
4. Chemical Bonding Agent – The chemical bonding agent shall be heat stable and compatible with asphalt and rubber.
5. Fibers - Polyester, fully drawn.

Length	10 mm [0.4 in] (max)
Denier	15 dpf (max)
Tenacity	4 gpd (min)
Crimp	none
Color	natural

Fiber Reinforced Modified Asphalt Compound Properties:

Fiber concentration	8% by weight of modified asphalt binder; uniform dispersion of fibers
Elongation	8% at 0°F (max)
Tensile Strength	450 psi at 0°F (min)

Blending of the fibers with the modified asphalt binder shall be in accordance with the recommendations of the manufacturer of the fibers.

The contractor shall provide the Resident or authorized representative with a copy of the material manufacturer’s recommendations for the sealant material being provided pertaining to heating, application, and reheating prior to the beginning of operations or the changing of materials.

Backer Rod Material: The use of backer rod material or bond breaker in the bottom of the crack to be filled is recommended to control the depth of the sealant, to achieve the desired shape factor, reservoir width to depth ration, and to support the sealant against indentation and sag. Backer rod materials and bond breakers should be compatible with the sealant, should not adhere to the sealant, should be compressible without extruding the sealant and should recover to maintain contact with the crack faces when the crack is open. The backer rod will be 25 percent larger in diameter than the width of the reservoir.

CONSTRUCTION REQUIREMENTS

Weather: Crack Sealant Material shall not be applied on a wet surface, after sunset or before sunrise, or when the atmospheric temperature is below 10°C [50°F] in a shaded area at the job site, or when weather conditions are otherwise unfavorable to proper construction procedures. The pavement temperature must be above 50°F (10°C) at the time of the installation of the hot applied crack sealing material.

Equipment: Equipment used in the performance of the work shall be subject to the Resident’s or authorized representative’s approval and shall be maintained in a satisfactory working condition at all times.

(a) Air Compressor: Air compressors shall be portable and capable of furnishing not less than 3 m³ [4 yd³] of air per minute at not less than 825 kPa [120 psi] pressure at the nozzle. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water.

(b) Sweeper: Manually operated, gas powered air-broom or self-propelled sweeper designed especially for use in cleaning pavements shall be used to remove debris, dirt, and dust from the cracks.

(c) Hot Air Lance: Should operate with propane and compressed air in combination at 1100°C - 1650°C [2000°F - 3000°F], exit air heated at not less than 825 kPa [120 psi]. The lance should

draw propane from no smaller than a 45 Kg [100 lb] tank using separate hoses for propane and air draw. The lance shall be designed in such that the flame does not come in contact with the pavement. The hoses shall be wrapped together with reflectorized wrap to keep them together and to protect workers in low light situations.

(d) Hand Tools: Shall consist of V-shaped squeegee, brooms, shovels, metal bars with chisel shaped ends, and any other tools which may be satisfactorily used to accomplish this work.

(e) Melting Kettle: The unit used to melt the joint sealing compound shall be a double boiler, indirect fired type. The space between inner and outer shells shall be filled with a suitable heat transfer oil or substitute having a flash point of not less than 320°C [608°F]. The kettle shall be equipped with a satisfactory means of agitating and mixing the joint sealer at all times. This may be accomplished by continuous stirring with mechanically operated paddles and/or a continuous circulating gear pump attached to the heating unit. The kettle must be equipped with thermostatic control calibrated between 94°C [200°F] and 290°C [550°F]. The sealant will not be heated to more than 20°F (-11°C) below the safe heating temperature. The safe heating temperature can be obtained from the manufacturer's shipping container. A direct connecting pressure type extruding device with nozzles shaped for insertion into the joint will be provided. Any sealant spilled on the surface of the pavement, structures, and/or lighting fixtures will be removed immediately.

(f) Application Wand: The application wand shall apply a controlled flow of material via an insulated or heated hose. The nozzle shall distribute the material as called for in this specification. A pressure regulator shall be provided to regulate pressure at the nozzle. A bypass line into the holding tank is required for use when the nozzle is shut off.

Preparation: All cracks greater than 5 mm [¼ in] shall be blown free of loose material, dirt, vegetation, and other debris by high pressure air. Existing crack seal material may remain and reheated in place. Material removed from the crack shall be removed from the pavement surface by means of a power sweeper or appropriate hand tools as required. Cracks showing evidence of vegetation after being blown out shall be additionally cleaned by appropriate hand tools and additionally blown out. All cracks must be blown and heated via the hot air lance a maximum of 5 minutes prior to the crack being sealed. Distance between the hot air lance and the crack sealing unit should be no more than 15 m [50 ft] to eliminate reinvasion of water, debris, and other incompressibles. All debris, vegetation, and water shall be removed to enhance adhesion of the crack sealing material. The crack faces will be surface dry when the seal is applied. THIS WORK SHALL NOT BE DONE IN INCLEMENT WEATHER.

Preparation and Placement of Sealer: The crack sealant material shall be heated in conformance with ASTM D 5167, Standards for Melting of Hot-Applied Joint and Crack Sealant and Filler for Evaluation, and applied at the temperature specified by the manufacturer and approved by the Resident or authorized representative. Any material that has been heated above the manufacturer's specification shall not be used. Material that is reheated or held at temperature for an extended period of time may be used as allowed by the manufacturer's specification and approval of the Resident or authorized representative. The Contractor shall provide the Resident

or authorized representative with a suitable device for verifying the sealant temperature in the kettle and at the application site.

Any over application or spills are to be removed to the satisfaction of the Resident or authorized representative. Any sealed areas with damaged or contaminated sealer or visible voids are to be removed, prepared and resealed at no additional cost to the Department.

Sealer shall be delivered to the crack while the cracks are still hot from the hot air lance preparation through a pressure hose line and applicator shoe. The crack sealant will be applied uniformly solid from bottom to top and will be filled without formation of entrapped air or voids. The sealant surface, when complete, will be 1/4-inch to 3/8-inch below existing pavement surface. A backing material will be placed to obtain the desired width to depth ratio and will be both non-reactive and non-adhesive to the pavement or the sealant material. There will be no sealer overbanding. The applicator shall be followed by a V-shaped squeegee to minimize the thickness of any inadvertent overband. Any loose material on the surface or in the crack, which may contaminate the crack sealer or impede bonding of the sealant to the pavement, is to be removed by hand tools prior to crack filling. No crack filling material shall be applied in a crack that is wet or where frost, snow, or ice is present. The ambient pavement temperature must be 10°C [50°F] or higher.

Blotter material such as Glenzoi, Black Beauty or an equivalent approved by the Department shall be provided by the Contractor and shall be applied to the crack sealer to prevent pickup and tracking. Blotter material shall be incidental to item 424.302.

Quality of Work Excess of spilled sealer shall be removed from the pavement by approved methods and discarded. Any quality of work determined to be below normal acceptable standards will not be accepted, and will be corrected and/or replaced as directed by the Resident or authorized representative at no additional cost to the Department.

Method of Measurement Sealant will be measured by the liter (gallon) of sealant used and include all additions such as crumb rubber, bonding agents, and fibers. The manufacturer's weights of the sealant will be accepted as the basis for measurement.

Basis of Payment. The accepted quantity of Crack Sealer will be paid for at the contract unit price per gallon complete in place. This price shall be full compensation for furnishing and placing crack sealer, including cleaning cracks and furnishing and placing barrier materials.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
424.302 Crack Sealer, Applied	Gallon

Item P-620 Runway and Taxiway Marking

DESCRIPTION

620-1.1 This item shall consist of the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer. The terms “paint” and “marking material” as well as “painting” and “application of markings” are interchangeable throughout this specification.

MATERIALS

620-2.1 Materials acceptance. The Contractor shall furnish manufacturer’s certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers 55 gallons or smaller for inspection by the Engineer. Material shall not be loaded into the equipment until inspected by the Engineer.

620-2.2 Marking materials. Paint shall be waterborne in accordance with the requirements of paragraph 620-2.2a. Paint shall be furnished in White-37925 and Yellow-33538 or 33655 in accordance with Federal Standard No. 595.

a. Waterborne. Paint shall meet the requirements of Federal Specification TT-P-1952E, Type II

b. Epoxy. Not Used.

c. Methacrylate. Not Used

d. Solvent-Base. Not Used.

e. Preformed Thermoplastic Airport Pavement Markings. Not Used.

620-2.3 Reflective media. Glass beads shall meet the requirements for TT-B-1325D Type III. Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Paint Color	Glass Beads, Type I, Gradation A	Glass Beads, Type III	Glass Beads, Type IV
White		See Table 1	
Yellow		See Table 1	

CONSTRUCTION METHODS

620-3.1 Weather limitations. The painting shall be performed only when the surface is dry and when the surface temperature is at least 45°F (7°C) and rising and the pavement surface temperature is at least 5°F (2.7°C) above the dew point or meets the manufacturer’s recommendations. Markings shall not be applied when the pavement temperature is greater than 130°F (55°C). Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns.

620-3.2 Equipment. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray.

620-3.3 Preparation of surface. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by waterblasting, shotblasting, grinding or sandblasting or by other methods as required to remove all contaminants without damage to the pavement surface. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Engineer. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

At least 24 hours prior to remarking existing markings, the existing markings must be removed such that 75% of the existing markings are removed with low (3,500-10,000 psi) waterblaster. After waterblasting, the surface shall be cleaned of all residue or debris either with sweeping or blowing with compressed air or both.

Prior to the initial application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer’s requirements, that the application equipment is appropriate for the type of marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufacturer’s surface preparation and application requirements must be submitted and approved by the Engineer prior to the initial application of markings.

620-3.4 Layout of markings. The proposed markings shall be laid out in advance of the paint application. All markings shall receive glass beads.

620-3.5 Application. Paint shall be applied at the locations and to the dimensions and spacing shown on the plans. Paint shall not be applied until the layout and condition of the surface has been approved by the Engineer. The edges of the markings shall not vary from a straight line more than 1/2 inch (12 mm) in 50 feet (15 m), and marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing	Tolerance
36 inch (910 mm) or less	±1/2 inch (12 mm)
greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)
greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)
greater than 60 feet (18.3 m)	±3 inch (76 mm)

The paint shall be mixed in accordance with the manufacturer’s instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted.

Prior to the application of markings, the Contractor shall certify in writing that the surface has been prepared in accordance with the paint manufacturer's requirements, that the application equipment is appropriate for the marking paint and that environmental conditions are appropriate for the material being applied. This certification along with a copy of the paint manufacturer's application and surface preparation requirements must be submitted to the Engineer prior to the initial application of markings.

Only a single application, at 100 percent of the specified application rate shall be required. Glass beads shall also be required.

620-3.6 Test strip. Prior to the full application of airfield markings, the Contractor shall produce a test strip in the presence of the Engineer. The test strip shall include the application of a minimum of 5 gallons (4 liters) of paint and application of 50 lbs (22.7 kg) of Type III glass beads. The test strip shall be used to establish thickness/darkness standard for all markings. The test strip shall cover no more than the maximum area prescribed in Table 1 (e.g., for 5 gallons of waterborne paint shall cover no more than 575 square feet.

**Table 1. Application Rates For Paint And Glass Beads
(See Note regarding Red and Pink Paint)**

Paint Type	Paint Square feet per gallon, ft ² /gal (Sq m per liter, m ² /l)	Glass Beads, Type I, Gradation A Pounds per gallon of paint-lb/gal (Km per liter of paint-kg/l)	Glass Beads, Type III Pounds per gallon of paint-lb/gal (Km per liter of paint-kg/l)	Glass Beads, Type IV Pounds per gallon of paint-lb/gal (Km per liter of paint-kg/l)
Waterborne Type II – White / Yellow	115 ft ² /gal max (2.8 m ² /l)	-	10 lb/gal min (1.2 kg/l)	-

Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 1. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment should be performed.

All emptied containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

620-3.7 Application--preformed thermoplastic airport pavement markings. Not Used.

620-3.8 Protection and cleanup. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose or unadhered reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1 The quantity of runway and taxiway markings to be paid for shall be the number of square feet of painting removed, the number of square feet of painting, and the number of pounds of reflective media performed in accordance with the specifications and accepted by the Engineer.

BASIS OF PAYMENT

620-5.1 Payment shall be made at the respective contract price per square foot for paint removal, price per square foot for runway and taxiway painting, and price per pound for reflective media. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item	620.511	Runway and Taxiway Marking Removed per square foot
Item	620.512	Runway and Taxiway Marking per square foot
Item	620.513	Reflective Media per pound

TESTING REQUIREMENTS

ASTM C371	Standard Test Method for Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
ASTM D711	Standard Test Method for No-Pick-Up Time of Traffic Paint
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

MATERIAL REQUIREMENTS

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
40 CFR Part 60, Appendix A-7, Method 24	Determination of volatile matter content, water content, density, volume solids, and weight solids of surface coatings
29 CFR Part 1910.1200	Hazard Communication

FED SPEC TT-B-1325D

Beads (Glass Spheres) Retro-Reflective

American Association of State Highway and Transportation Officials (AASHTO) M247

Standard Specification for Glass Beads Used in Pavement Markings

FED SPEC TT-P-1952E

Paint, Traffic and Airfield Marking, Waterborne

Commercial Item Description A-A-2886B

Paint, Traffic, Solvent Based

FED STD 595

Colors used in Government Procurement

AC 150/5340-1

Standards for Airport Markings

END OF ITEM P-620

Section 659 Mobilization

659-1 Description. This item shall consist of work and operations, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project sites for work on the projects except as provided in the contract as separate pay items.

659-1.1 Posted notices. Prior to commencement of construction activities the Contractor must post the following documents in a prominent and accessible place where they may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster “Equal Employment Opportunity is the Law” in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246, as amended; Davis Bacon Wage Poster (WH 1321) - DOL “Notice to All Employees” Poster; and Applicable Davis-Bacon Wage Rate Determination. These notices must remain posted until final acceptance of the work by the Owner.

The Owner may include additional posted notices as required by local and State law.

659-2 Basis of measurement and payment. Based upon the contract lump sum price for “Mobilization” partial payments will be allowed as follows:

- a. With first pay request, 25%.
- b. When 25% or more of the original contract is earned, an additional 25%.
- c. When 50% or more of the original contract is earned, an additional 40%.
- d. After Final Inspection, Staging area clean-up and delivery of all Project Closeout materials as required by 90-11, the final 10%.

END OF SECTION 659

STANDARD DETAIL UPDATES

Standard Details and Standard Detail updates are available at:
<http://maine.gov/mdot/contractors/publications/standarddetail/>

<u>Detail #</u>	<u>Description</u>	<u>Revision Date</u>
501(02)	Pipe Pile Splice	3/05/2015
501(03)	H – Pile Splice	3/05/2015

SUPPLEMENTAL SPECIFICATION
(Corrections, Additions, & Revisions to Standard Specifications - November 2014)

SECTION 101
CONTRACT INTERPRETATION

101.2 Definitions

Page 1-5 – Remove the definition of Bridge in its entirety and replace with:

“Bridge A structure that is erected over a depression or an obstruction, such as water, a highway or a railway, and has an opening measured along the centerline of the Roadway of more than 20 feet between: The faces of abutments; spring line of arches; extreme ends of openings of box culverts, pipes or pipe arches; or the extreme ends of openings for multiple box culverts, pipes or pipe arches.”

Page 1-12 – Remove the definition of Large Culvert in its entirety and replace with:

“Large Culvert Any structure not defined as a Culvert or Bridge that provides a drainage or non-drainage opening under the Roadway or Approaches to the Roadway, with an opening that is 5 feet but less than 10 feet.”

Remove the definition of Minor Span in its entirety and replace with:

“Minor Span Same definition as Bridge, except having an opening of between 10 feet and 20 feet, inclusive.”

SECTION 104
GENERAL RIGHTS AND RESPONSIBILITIES

104.5.5 Prompt Payment of Subcontractors Add the following paragraph to this subsection:

C. Payment Tracking Federal Projects On federally funded projects, the prime contractor, subcontractors and lower-tier subcontractors will track and confirm the delivery and receipt of all payments through the Elation System. They will be responsible for entering all payments to all sub and lower tier contractors. MaineDOT will run a query monthly to ensure that contractors are complying and generate an e-mail to contractors who have not responded to confirm receipt of MaineDOT payment or contractor payment to lower tier subcontractors.

SECTION 105
GENERAL SCOPE OF WORK

105.4.5 Special Detours Remove this subsection in its entirety and replace with:

“105.4.5 Maintenance of Existing Structures When a new Bridge or Minor Span is being installed on a new alignment and the existing structure is to remain in service, the Department will maintain the existing structure and the portions of the roadway required for maintaining traffic until such time that the new structure is opened to traffic and the existing structure is taken out of service. A similar situation exists when a new Bridge or Minor Span is being installed on the same alignment as the existing structure, requiring a temporary detour to be installed by the Contractor per Section 510, Special Detours,

prior to removal of the existing structure. In this case, the Department will maintain the existing structure and the portions of the existing roadway required for maintaining traffic until such time that either the temporary detour is opened to traffic or the Contractor begins any work on the existing structure, including, but not limited to, repairs, modifications, moving, demolition or removal. In either case, once the new structure or temporary detour is opened to traffic, or the Contractor begins any work on the existing structure, the Contractor shall be solely responsible for all maintenance of the existing structure and the portions of the existing approaches that lie outside the new roadway or the temporary detour, respectively. This specification is not intended to supersede Standard Specification Section 104.3.11, Responsibility for Property of Others.”

105.6.2.4 Department Verification Add the following to the end of the first sentence: “or other approved method, such as reference staking, to allow the Department to independently verify the accuracy of the work, as approved by the Department.”

SECTION 109 **CHANGES**

109.5.1 Definitions - Types of Delays In Paragraph ‘A’ delete “Equitable Adjustment” and replace with “adjustment of time”.

APPENDIX A TO DIVISION 100

Remove Section D in its entirety as this is now covered in Section 105.10 EQUAL OPPORTUNITY AND CIVIL RIGHTS.

SECTION 203 **EXCAVATION AND EMBANKMENT**

203.02 Materials

At the bottom of page 2-12, add as the first item in the list:

Crushed Stone, ¾ inch 703.13

203.042 Rock Excavation and Blasting

On page 2-16, add the word “No” to the third sentence in Section 5 Submittals, Subsection V, 1 so that it reads:

“No blasting products will be allowed on the job site if the date codes are missing.”

SECTION 304 **AGGREGATE BASE AND SUBBASE COURSE**

304.02 Aggregate

Remove the sentence “Aggregate for base and subbase courses shall be material meeting the aggregate type requirements specified in the following table” in its entirety and the table that follows it with headings of ‘Material’ and ‘Aggregate Type’.

304.02 – Aggregate Add the following sentence before the sentence starting with “When designated on the plans...”: **“Aggregate Base Course – Type C will be capped with 2” of millings or Untreated Aggregate Surface Course – Type B. Payment for this material will be made under 304.16”**

SECTION 307 **FULL DEPTH RECYCLED PAVEMENT**

Remove this Section in its entirety and replace with:

SECTION 307 **FULL DEPTH RECYCLING** **(UNTREATED OR TREATED WITH EMULSIFIED ASPHALT STABILIZER)**

307.01 Description This work shall consist of pulverizing a portion of the existing roadway structure into a homogenous mass, adding an emulsified asphalt stabilizer (if required) to the depth of the pulverized material specified in the contract, placing and compacting this material to the lines, grades, and dimensions shown on the plans or established by the Resident.

MATERIALS

307.02 Pulverized Material Pulverized material shall consist of the existing asphalt pavement layers and one inch or more as specified of the underlying gravel, pulverized and blended into a homogenous mass. Pulverized material will be processed to 100% passing a 2 inch square mesh sieve.

307.021 New Aggregate and Additional Recycled Material New aggregate, if required by the contract, shall meet the requirements of Subsection 703.10 - Aggregate for Untreated Surface Course and Leveling Course, Type A. Aggregate Subbase Course Gravel Type D processed to 100 percent passing a 2 inch square mesh sieve and meeting the requirements of 703.06 – Aggregate for Base and Subbase may be used in areas requiring depths greater than 2 inches. New aggregate, will be measured and paid for under the appropriate item.

Recycled material, if required, shall consist of salvaged asphalt material from the project or from off-site stockpiles that has been processed before use to 100 percent passing a 2 inch square mesh sieve. Recycled material shall be conditionally accepted at the source

by the Resident. It shall be free of winter sand, granular fill, construction debris, or other materials not generally considered asphalt pavement.

Recycled material generated and salvaged from the project shall be used within the roadway limits to the extent it is available as described in 307.09. No additional payment will be made for material salvaged from the project.

Recycled material supplied from off-site stockpiles shall be paid for as described in the contract, or by contract modification.

307.022 Emulsified Asphalt Stabilizer. If required, the emulsified asphalt stabilizer shall be grade MS-2, MS-4, SS-1, or CSS-1 meeting the requirements of Subsection 702.04 Emulsified Asphalt.

307.023 Water Water shall be clean and free from deleterious concentrations of acids, alkalis, salts or other organic or chemical substances.

307.024 Portland Cement If required, Portland Cement shall be Type I or II meeting the requirements of AASHTO M85.

307.025 Hydrated Lime If required, Hydrated Lime shall meet the requirements of AASHTO M216.

EQUIPMENT

307.03 Pulverizer The pulverizer shall be a self-propelled machine, specifically manufactured for full-depth recycling work and capable of reducing the required existing materials to a size that will pass a 2 inch square mesh sieve. The machine shall be equipped with standard automatic depth controls and must maintain a consistent cutting depth and width. The machine also shall be equipped with a gauge to show depth of material being processed.

307.04 Liquid Mixer Unit or Distributor. If treatment of the recycled layer with emulsified asphalt is required by the contract, a liquid mixing unit or distributor shall be used to introduce the emulsified asphalt stabilizer into the pulverized material. The mixing unit shall contain a liquid distribution and mixing system which has been specifically manufactured for full-depth recycling work, capable of mixing the pulverized material with an evenly metered distribution of emulsified asphalt into a homogeneous mixture, to the depth and width required.

The mixing unit shall be designed, equipped, maintained, and operated so that emulsified asphalt stabilizer at constant temperature may be applied uniformly on variable widths of pulverized material up to 6 feet at readily determined and controlled rates from 0.01 to 1.06 gal/yd² with uniform pressure and with an allowable variation from any specified rate not to exceed 0.01 gal/ yd². Mixing units shall include a tachometer, pressure gages, and accurate volume measuring devices or a calibrated tank and a thermometer for measuring temperatures of tank contents.

307.041 Cement or Lime Spreader If required by the contract, spreading of the Portland Cement or Hydrated Lime shall be done with a spreader truck designed to spread dry particulate (such as Portland Cement or Lime) or other approved means to insure a uniform distribution across the roadway and minimize fugitive dust. Pneumatic application, including through a slotted pipe, will not be permitted. Other systems that have been developed include fog systems, vacuum systems, etc. Slurry applications may also be accepted. The Department reserves the right to accept or reject the method of spreading cement. The Contractor shall provide a method for verifying that the correct amount of cement is being applied.

307.05 Placement Equipment Placement of the Full Depth recycled material to the required slope and grade shall be done with an approved highway grader or by another method approved by the Resident.

307.06 Rollers The full depth recycled material shall be rolled with a vibratory pad foot roller, a vibratory steel drum soil compactor and a pneumatic tire roller. The pad foot roller drum shall have a minimum of 112 tamping feet 3 inches in height, a minimum contact area per foot of 17 inch², and a minimum width of 84 inches. The vibratory steel drum roller shall have a minimum 84 inch width single drum. The pneumatic tire roller shall meet the requirements of Section 401.10 and the minimum allowable tire pressure shall be 85 psi.

MIX DESIGN

If treatment of the recycled layer with emulsified asphalt is required by the contract, the Department will supply a mix design for the emulsified asphalt stabilized material based on test results from pavement and soil analysis taken to the design depth. The Department will provide the following information prior to construction:

1. Percent of emulsified asphalt to be used.
2. Quantity of lime or cement to be added.
3. Optimum moisture content for proper compaction.
4. Additional aggregate (if required).

After a test strip has been completed or as the work progresses, it may be necessary for the Resident to make necessary adjustments to the mix design. Changes to compensation will be in accordance with the Mix Design Special Provision.

CONSTRUCTION REQUIREMENTS

307.06 Pulverizing The entire depth of existing pavement shall be pulverized together with 1 inch or more of the underlying gravel into a homogenous mass. All pulverizing shall be done with equipment that will provide a homogenous mass of pulverized material, processed in-place, which will pass a 2 inch square mesh sieve.

307.07 Weather Limitations Full depth recycled work shall be performed when;

- A. Recycling operations will be allowed between May 15th and September 15th inclusive in Zone 1 - Areas north of US Route 2 from Gilead to Bangor and north of Route 9 from Bangor to Calais.
- B. The atmospheric temperature, as determined by an approved thermometer placed in the shade at the recycling location, is 50°F and rising.
- C. When there is no standing water on the surface.
- D. During generally dry conditions, or when weather conditions are such that proper pulverizing, mixing, grading, finishing and curing can be obtained using proper procedures, and when compaction can be accomplished as determined by the Resident.
- E. When the surface is not frozen and when overnight temperatures are expected to be above 32°F.
- F. Wind conditions are such that the spreading of lime or cement on the roadway ahead of the recycling machine will not adversely affect the operation.

307.08 Surface Tolerance The complete surface of the Full Depth Recycled course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape, of $\frac{3}{8}$ inch.

307.09 Full Depth Recycling Procedure New aggregate or recycled material meeting the requirements of Section 307.021 - New Aggregate and Additional Recycled Material, shall be added as necessary to restore cross-slope and/or grade before pulverizing. Locations will be shown on the plans or described in the construction notes. The Resident may add other locations while construction of the project is in progress. The Contractor will use recycled material to the extent it is available, in lieu of new aggregate. The material shall then be pulverized, processed, and blended into a homogeneous mass passing a 2 inch square mesh sieve. Material found not pulverized down to a 2 inch size will be required to be reprocessed by the recycler with successive passes until approved by the Resident.

Should the Contractor be required to add new aggregate or recycled material to restore cross-slope and/or grade after the initial pulverizing process, those areas will require re-processing to blend into a homogenous mass passing a 2 in square mesh sieve.

Sufficient water shall be added during the recycling process to maintain optimum moisture for compaction.

The resultant material from the initial pulverizing processes shall be graded and compacted to the cross-slope and profile shown on the plans or as directed by the Resident. The Contractor will also be responsible for re-establishing the existing profile grade. The completed surface of the full depth recycled course shall be shaped and maintained to a tolerance, above or below the required cross sectional shape, of $\frac{3}{8}$ inch. Areas not meeting this tolerance will be repaired as described in Section 307.091. The initial pulverizing process density requirements will be the same as Section 307.101 unless otherwise directed by the Resident.

Additives, if required, shall be introduced following completion of the initial pulverizing and blending process. Emulsified asphalt stabilizer shall be incorporated into the top of

the processed material as specified in section 307.04 to the depth specified in the contract by use of the liquid mixer unit or a distributor, at the rate specified in the mix design. The emulsified asphalt shall then be uniformly blended into a homogeneous mass until an apparent uniform distribution has occurred. The rate of application may be adjusted as necessary by the Resident. Cement or lime shall be introduced as described in section 307.041. The resultant material shall be graded and compacted to the cross-slope and profile shown on the plans or as directed by the Resident. The Contractor will also be responsible for re-establishing the existing profile grade.

After final compaction, the roadway surface shall be treated with a light application of water, and rolled with pneumatic-tired rollers to create a close-knit texture. The finished layer shall be free from:

- A. Surface laminations.
- B. Segregation of fine and coarse aggregate.
- C. Corrugations, centerline differential, potholes, or any other defects that may adversely affect the performance of the layer, or any layers to be placed upon it.

The Contractor shall protect and maintain the recycled layer until a lift of pavement is applied. Any damage or defects in the layer shall be repaired immediately. An even and uniform surface shall be maintained. The recycled surface shall be swept prior to hot mix asphalt overlay placement.

307.091 Repairs Repairs and maintenance of the recycled layers, resulting from damage caused by traffic, weather or environmental conditions, or resulting from damage caused by the Contractor's operations or equipment, shall be completed at no additional cost to the Department.

For recycled layers stabilized with emulsified asphalt, low areas will be repaired using a hot mix asphalt shim. Areas up to 1 inch high can be repaired by milling or shimming with hot mix asphalt. Areas greater than 1 inch high will be repaired using a hot mix asphalt shim. All repair work will be done with the Resident's approval at the Contractor's expense.

TESTING REQUIREMENTS

307.10 Quality Control The Contractor shall operate in accordance with the approved Quality Control Plan (QCP) to assure a product meeting the contract requirements. The QCP shall meet the requirements of Section 106.4 - Quality Control and this Section. The Contractor shall not begin recycling operations until the Department approves the QCP in writing.

Prior to performing any recycling process, the Department and the Contractor shall hold a Pre-recycle conference to discuss the recycling schedule, type and amount of equipment

to be used, sequence of operations, and traffic control. A copy of the QC random numbers to be used on the project shall be provided to the Resident. All field supervisors including the responsible onsite recycling process supervisor shall attend this meeting.

The QCP shall address any items that affect the quality of the Recycling Process including, but not limited to, the following:

- A. Sources for all materials, including New Aggregate and Additional Recycled Material.
- B. Make and type of rollers including weight, weight per inch of steel wheels, and average contact pressure for pneumatic tired rollers.
- C. Testing Plan.
- D. Recycling operations including recycling speed, methods to ensure that segregation is minimized, grading and compacting operations.
- E. Methods for protecting the finished product from damage and procedures for any necessary corrective action.
- F. Method of grade checks.
- G. Examples of Quality Control forms.
- H. Name, responsibilities, and qualifications of the Responsible onsite Recycling Supervisor experienced and knowledgeable with the process.
- I. A note that all testing will be done in accordance with AASHTO and MDOT/ACM procedures.

The Project Superintendent shall be named in the QCP, and the responsibilities for successful implementation of the QCP shall be outlined.

The Contractor shall sample, test, and evaluate the full depth reclamation process in accordance with the following minimum frequencies:

MINIMUM QUALITY CONTROL FREQUENCIES

Test or Action	Frequency	Test Method
Density	1 per 1000 feet / lane	AASHTO T 310
Air Temperature	4 per day at even intervals	
Surface Temperature	At the beginning and end of each days operation	
Yield of all materials (Daily yield, yield since last test, and total project yield.)	1 per 1000 ft/lane	

The Department may view any QC test and request a QC test at any time. The Contractor shall submit all QC test reports and summaries in writing, signed by the appropriate technician, to the Department’s onsite representative by 1:00 P.M. on the next working day, except when otherwise noted in the QCP due to local restrictions. The Contractor shall make all test results, including randomly sampled densities, available to the Department onsite.

The Contractor shall cease recycling operations whenever one of the following occurs:

- A. The Contractor fails to follow the approved QCP.**
- B. The Contractor fails to achieve 98 percent density after corrective action has been taken.**
- C. The finished product is visually defective, as determined by the Resident.**
- D. The computed yield differs from the mix design by 10 percent or more.**

Recycling operations shall not resume until the Department approves the corrective action to be taken.

307.101 Test Strip The contractor shall assemble all items of equipment for the recycling operation on the first day of the recycling work. The Contractor shall construct a test strip for the project at a location approved by the Resident. The Responsible onsite Recycling Supervisor will work with Department personnel to determine the suitability of the mixed material, moisture control within the mixed material, and compaction and surface finish. The test strip section is required to:

- A. Demonstrate that the equipment and processes can produce recycled layers to meet the requirements specified in these special provisions.**
- B. Determine the effect on the gradation of the recycled material by varying the forward speed of the recycling machine and the rotation rate of the milling drum.**
- C. Determine the optimum moisture necessary to achieve proper compaction of the recycled layer.**
- D. Determine the sequence and manner of rolling necessary to obtain the compaction requirements and establish a target density. The Contractor and the Department will both conduct testing with their respective gauges at this time.**

The test strip shall be at least 300 feet in length of a full lane-width (or a half-road width). Full recycling production will not start until a passing test strip has been accomplished. If a test strip fails to meet the requirements of this specification, the Contractor will be required to repair or replace the test strip to the satisfaction of the Resident. Any repairs, replacement, or duplication of the test strip will be at the Contractor's expense.

After the test strip has been pulverized, and the roadway brought to proper shape, the Contractor shall add water until it is determined that optimum moisture has been obtained. The test strip shall then be rolled using the specified compaction equipment as directed until the density readings show an increase in dry density of less than 1 pcf for the final four roller passes of each roller. The Contractor and Department will each determine a target density using their respective gauges by performing several additional density tests and averaging them. The average of these tests will be used as the target density of the recycled material for QC and Acceptance purposes.

Following completion of the test strip, compaction of the material shall continue until a density of not less than 98 percent of the test strip target density has been achieved for the full width and depth of the layer. During the construction and compaction of the Full Depth Recycled base, should three consecutive Acceptance test results for density fail to

meet a minimum of 95 percent of the target density, or exceed 102 percent of target density, a new test strip shall be constructed.

ACCEPTANCE TEST FREQUENCY

Property	Frequency	Test Method
In-place Density	1 per 2000 ft / lane	AASHTO T 310

308.102 Curing. No new pavement shall be placed on the full depth recycled pavement until curing has reduced the moisture content to 1 percent or less by total weight of the mixture, or a curing period of 4 days has elapsed, whichever comes first.

307.11 Method of Measurement Full Depth Recycled Pavement (Untreated or Treated with Emulsified Asphalt Stabilizer) will be measured by the square yard.

307.12 Basis of Payment The accepted quantity of Full Depth Recycled Asphalt Pavement (Untreated or Treated with Emulsified Asphalt Stabilizer) will be paid for at the contract unit price per square yard, complete in-place which price will be full compensation for furnishing all equipment, materials and labor for pulverizing, blending, placing, grading, compacting, and for all incidentals necessary to complete the work.

The addition of materials to restore profile grade and/or cross-slope in areas shown on the plans or described in the construction notes will be paid separately under designated pay items within the contract. No additional payment will be made for materials salvaged from the project.

Payments will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
307.331 Full Depth Recycled Pavement (Untreated) Yard	Square
307.332 Full Depth Recycled Pavement (with Emulsified Asphalt Stabilizer) 5 in. depth Yard	Square
307.333 Full Depth Recycled Pavement (with Emulsified Asphalt Stabilizer) 6 in. depth Yard	Square

SECTION 411
UNTREATED AGGRAGATE SURFACE COURSE

411.02 – Aggregate Add the following to the end of the first sentence: “- Type A”

SECTION 502 STRUCTURAL CONCRETE

502.05 Composition and Proportioning

Replace Table 1 with

TABLE 1

Concrete CLASS	Minimum Compressive Strength (PSI)	Permeability as indicated by Surface Resistivity (KOhm-cm)	Entrained Air (%)		Notes
			LSL	USL	
S	3,000	N/A	N/A	N/A	4,5
A	4,000	14	6.0	9.0	1,4,5
P	-----	-----	5.5	7.5	1,2,3,4
LP	5,000	17	6.0	9.0	1,4,5
Fill	3,000	N/A	6.0	9.0	4,5

In the list of information submitted by the contractor for a mix design:

Item J Replace “Target Coulomb Value.” with “Target KOhm-cm Value.”

502.1703 Acceptance Methods A and B

In the paragraph that starts with “The Department will take Acceptance...” Remove the word chloride from chloride permeability in the last sentence.

Replace the paragraph starting with “Rapid Chloride Permeability specimens...” With the following:

“Surface Resistivity specimens will be tested by the Department in accordance with AASHTO TP-95 at an age \geq 56 days. Four 4 inch x 8 inch cylinders will be cast per subplot placed. The average of three concrete specimens per subplot will constitute a test result and this average will be used to determine the permeability for pay adjustment computations.”

502.1706 Acceptance Method C

Remove in its entirety and Replace with:

502.1706 Acceptance Method C The Department will determine the acceptability of the concrete through Acceptance testing. Acceptance tests will include compressive strength, air content and permeability. Method C concrete with a failing permeability as indicated by the surface resistivity test may be tested for permeability in accordance with the Rapid Chloride Permeability Test AASHTO T-277 averaging the results from two specimens cut from the samples prepared for the surface resistivity test. Method C concrete not meeting the requirements listed in Table 1 or if the Rapid Chloride Permeability test results in values exceeding 2000 coulombs for Class LP or 2400 for Class A, shall be

removed and replaced at no cost to the Department. At the Department’s sole discretion, material not meeting requirements may be left in place and paid for at a reduced price as described in Section 502.195.

502.1707 Resolution of Disputed Acceptance Test Results

Section B

Remove “Rapid Chloride” from the section heading.
In paragraph 4 replace T-277 with TP-95

502.192 Pay Adjustment for Chloride Permeability

Remove “Chloride” from the heading and from the first sentence.

Replace the sentence that starts with “values greater than...” and replace with “values less than 10 KOhms-cm for Class A concrete or 11 KOhms-cm for Class LP concrete shall be subject to rejection and replacement, at no additional cost to the Department.”

502.194 Pay Adjustments for Compressive Strength, Chloride Permeability and Air Content, Methods A and B

Remove the word “Chloride” from the section heading and from the equation for CPF.

502.195 Pay Adjustment Method C

Table 6: Method C Pay Reductions (page 5-53)
Under “Entrained Air” for “Class Fill”, in the first line,
change from “< 4.0 (Removal)” to “< **4.5 (Removal)**”

In Table 6: Method C PAY REDUCTIONS remove the word ‘Chloride’ from ‘Chloride Permeability’.

SECTION 619
MULCH

619.07 Basis of Payment

In the list of Pay Items add “**619.12 Mulch**” with a Pay Unit of “ **Unit** ”.
Change the description of 619.1201 from “Mulch” to “**Mulch – Plan Quantity**”

In the list of Pay Items add “**619.13 Bark Mulch**” with a Pay Unit of “ **CY** ”.
Change the description of 619.1301 from “Bark Mulch” to “**Mulch – Plan Quantity**”

In the list of Pay Items add “**619.14 Erosion Control Mix**” with a Pay Unit of “ **CY** ”.
Change the description of 619.1401 from “Erosion Control Mix” to “**Mulch – Plan Quantity**”

SECTION 621
LANDSCAPING

621.0002 Materials - General

In the list of items change “Organic Humus” to “**Humus**”.

621.0019 Plant Pits and Beds

c Class A Planting

In the third paragraph beginning with “ The plant pit...” change “½ inch” to “**1 inch**”

SECTION 626
**FOUNDATIONS, CONDUIT AND JUNCTION BOXES FOR HIGHWAY
SIGNING, LIGHTING AND SIGNALS**

626.034 Concrete Foundations

On Page 6-85, add the following paragraph before the paragraph beginning with “Drilled shafts shall not be...”.

No foundation design will be required for 18- and 24-inch diameter foundations for structures less than 30-feet tall and with no projecting arms. A foundation design prepared by a Professional Engineer licensed in accordance with the laws of the State of Maine will be required for all other foundations. Precast foundations will be permitted for 18 and 24-inch diameter foundations for structures less than 30-feet tall and with no projecting arms. Where precast foundations are permitted flowable concrete fill shall be used as backfill in the annular space, and placed from the bottom up. Construction of precast foundations shall conform to the Standard Details and all requirements of Section 712.061 except that the concrete shall have a minimum permeability of 17 kOhm-cm and the use of calcium nitrite will not be required.

On Page 6-86, add the following to the paragraph beginning with “Concrete for drilled shafts...” so that it reads as follows:

“...The Contractor shall provide temporary dewatering of excavations for foundations such that concrete is placed in the dry. Concrete for drilled shafts shall be placed in accordance with Section 503.10 as temporary casing is withdrawn to prevent debris from contaminating the foundation and to ensure concrete is cast against the surrounding soil. Concrete for drilled shafts and spread footings shall be Class A in accordance with Section 502 - Structural Concrete. Precast foundations will not be permitted except as specified above in this Section. Backfill for spread footing foundations shall be Gravel Borrow meeting the requirements of Section 703.20 - Gravel Borrow....”

SECTION 652
MAINTENANCE OF TRAFFIC

652.3 Submittal of Traffic Control Plan On page **6-148**, note **f**, in the last sentence change the 105.2.2 to 105.2.3 so that the last sentence reads, “**For a related provision, see Section 105.2.3 – Project Specific Emergency Planning.**”.

SECTION 660
ON-THE-JOB TRAINING

660.06 Method of Measurement

Remove the first sentence in its entirety and replace with “**The OJT item will be measured by the number of OJT hours by a trainee who has successfully completed an approved training program.**”

660.07 Basis of payment to the Contractor

Remove the last word in the first sentence so that the first sentence reads “The OJT shall be paid for once successfully completed at the contract unit price per **hour.**”

Payment will be made under

Change the Pay Item from “660.22” to “**660.21**” and change the Pay Unit from “Each” to “**Hour**”.

SECTION 677

On page 6 - 203 change “636.041” to “677.041”

SECTION 703
AGGREGATES

703.0201 Alkali Silica Reactive Aggregates

Remove this section in its entirety and replace with the following:

703.0201 Alkali Silica Reactive Aggregates. All coarse and fine aggregates proposed for use in concrete shall be tested for Alkali Silica Reactivity (ASR) potential under AASHTO T 303 (ASTM C 1260), Accelerated Detection of Potentially Deleterious Expansion of Mortar Bars Due to Alkali-Silica Reaction, prior to being accepted for use. Acceptance will be based on testing performed by an accredited independent lab submitted to the Department. Aggregate submittals will be required on a 5-year cycle, unless the source or character of the aggregate in question has changed within 5 years from the last test date.

As per AASHTO T 303 (ASTM C 1260): Use of a particular coarse or fine aggregate will be allowed with no restrictions when the mortar bars made with this aggregate expand less than or equal to 0.10 percent at 30 days from casting. Use of a particular coarse or fine aggregate will be classified as potentially reactive when the mortar bars made with this aggregate expand greater than 0.10 percent at 30 days from casting. Use of this aggregate will only be allowed with the use of cement-pozzolan blends and/or chemical admixtures that result in mortar bar expansion of less than 0.10 percent at 30 days from casting as tested under ASTM C 1567.

Acceptable pozzolans and chemical admixtures that may be used when an aggregate is classified as potentially reactive include, but are not limited to the following:

Class F Coal Fly Ash meeting the requirements of AASHTO M 295.

Ground Granulated Blast Furnace Slag (Grade 100 or 120) meeting the requirements of AASHTO M 302.

Densified Silica Fume meeting the requirements of AASHTO M 307.

Lithium based admixtures

Metakaolin

Pozzolans or chemical admixtures required to offset the effects of potentially reactive aggregates will be incorporated into the concrete at no additional cost to the Department.

703.06 Aggregate for Base and Subbase

Remove the first two paragraphs in their entirety and replace with these:

“The following shall apply to Sections (a.) and (c.) below. The material shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0, the Washington State Degradation DOT Test Method T113, Method of Test for Determination of Degradation Value (January 2009 version) shall be performed, except that the test shall be performed on the portion of the sample that passes the 1/2 in sieve and is retained on the No. 10 sieve. If the material has a Washington Degradation value of less than 15, the material shall be rejected.

The material used in Section (b.) below shall have a Micro-Deval value of 25.0 or less as determined by AASHTO T 327. If the Micro-Deval value exceeds 25.0 the material may be used if it does not exceed 25 percent loss on AASHTO T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine. “

703.33 Stone Ballast

In the third paragraph, remove the words “less than” before 2.60 and add the words “**or greater**” after 2.60.

SECTION 717
ROADSIDE IMPROVEMENT MATERIAL

717.02 Agricultural Ground Limestone

In the table after the third paragraph which starts with “Liquid lime...” change the Specification for Nitrogen (N) from “15.5 percent of which 1% is from ammoniac nitrogen and 14.5 /5 is from Nitrate Nitrogen” to read “**15.5 % of which 1% is from Ammoniacal Nitrogen and 14.5 % is from Nitrate Nitrogen**”



**FAA
Airports**

Required Contract Provisions for Airport Improvement Program and for Obligated Sponsors

Contents

1. REQUIRED CONTRACT PROVISIONS.

Federal laws and regulations require that specific contract provisions be included in certain contracts, requests for proposals, or invitations to bid **whether or not** the contracts are federally-funded. This requirement is established within the grant assurances. Other contract provisions are required to be in federally-funded contracts, including all subcontracts. For purposes of determining requirements for contract provisions, the term **contract** includes subcontracts.

The type and magnitude of a project determines whether a provision is required. Some Federal provisions have dollar thresholds that define when they are applicable. The majority of the Federal provisions may be incorporated within the contract itself. However, certain Federal notices are required to be identified within the Notice-to-Bidders.

1.1. GENERAL REQUIREMENT FOR CONTRACTS.

In general, the sponsor must:

- 1) Physically incorporate these contract provisions (not simply by reference) in each contract funded under AIP;
- 2) Require the contractor (including all subcontractors) to insert these contract provisions in each contract and subcontract, and further require that the clauses be included in all subcontracts;
- 3) Require the contractor (or subcontractor) to incorporate applicable requirements of these contract provisions by reference for work done under any purchase orders, rental agreements and other agreements for supplies or services;
- 4) Require that the prime contractor be responsible for compliance with these contract provisions by any subcontractor, lower-tier subcontractor or service provider; and

- 5) Not modify the provisions. Minor additions covering state or sponsor requirements may be included in a separate supplemental specification, provided they do not conflict with federal laws and regulations and do not change the intent of the required contract provision.

Subject to the applicability criteria noted in the specific contract provisions, these contract provisions apply to all work performed on the contract.

2. ACCESS TO RECORDS AND REPORTS.

(Reference: 2 CFR § 200.326, 2 CFR § 200.333)

ACCESS TO RECORDS AND REPORTS

The Contractor must maintain an acceptable cost accounting system. The Contractor agrees to provide the Sponsor, the Federal Aviation Administration, and the Comptroller General of the United States or any of their duly authorized representatives access to any books, documents, papers, and records of the contractor which are directly pertinent to the specific contract for the purpose of making audit, examination, excerpts and transcriptions. The Contractor agrees to maintain all books, records and reports required under this contract for a period of not less than three years after final payment is made and all pending matters are closed.

3. AFFIRMATIVE ACTION REQUIREMENT.

(Reference: 41 CFR part 60-4, Executive Order 11246)

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:
 - A. Timetables
 - B. Goals for minority participation for each trade (Vol. 45 Federal Register pg. 65984 10/3/80)
 - C. Goals for female participation in each trade (6.9%)

These goals are applicable to all of the contractor's construction work (whether or not it is Federal or federally-assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor is also subject to the goals for both federally funded and non-federally funded construction regardless of the percentage of federal participation in funding.

The contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations

required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training shall be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project, for the sole purpose of meeting the contractor's goals, shall be a violation of the contract, the Executive Order, and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director, Office of Federal Contract Compliance Programs (OFCCP), within 10 working days of award of any construction subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address, and telephone number of the subcontractor; employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of subcontract; and the geographical area in which the subcontract is to be performed.

4. As used in this notice and in the contract resulting from this solicitation, the "covered area" is [insert description of the geographical areas where the contract is to be performed giving the state, county, and city, if any].

3.1. AFFIRMATIVE ACTION PLAN.

The Department of Labor is responsible for administering the Executive Order 11246, which contains requirements for an Affirmative Action Plan. This Plan is similar in content and requirements to the affirmative action plan required in 49 CFR Part 152 subpart e. 49 CFR Part 152 applied to grants issued under the Airport Development Aid Program, which was replaced by the Airport Improvement Program.

4. BREACH OF CONTRACT TERMS.

(Reference 2 CFR § 200 Appendix II(A))

BREACH OF CONTRACT TERMS

Any violation or breach of terms of this contract on the part of the contractor or its subcontractors may result in the suspension or termination of this contract or such other action that may be necessary to enforce the rights of the parties of this agreement. The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder are in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law.

5. BUY AMERICAN PREFERENCE.

(Reference: 49 USC § 50101)

BUY AMERICAN CERTIFICATION

The contractor agrees to comply with 49 USC § 50101, which provides that Federal funds may not be obligated unless all steel and manufactured goods used in AIP-funded projects are produced in the United States, unless the FAA has issued a waiver for the product; the product is listed as an Excepted Article, Material Or Supply in Federal Acquisition Regulation subpart 25.108; or is included in the FAA Nationwide Buy American Waivers Issued list.

A bidder or offeror must submit the appropriate Buy America certification (below) with all bids or offers on AIP funded projects. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive.

Type of Certification is based on Type of Project:

There are two types of Buy American certifications.

- For projects for a facility, the Certificate of Compliance Based on Total Facility (Terminal or Building Project) must be submitted.
- For all other projects, the Certificate of Compliance Based on Equipment and Materials Used on the Project (Non-building construction projects such as runway or roadway construction; or equipment acquisition projects) must be submitted.

Certificate of Buy American Compliance for Total Facility

(Buildings such as Terminal, SRE, ARFF, etc.)

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one of the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (i.e. not both) by inserting a checkmark (✓) or the letter "X".

- Bidder or offeror hereby certifies that it will comply with 49 USC. 50101 by:
- a) Only installing steel and manufactured products produced in the United States; or
 - b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing; or
 - c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
2. To faithfully comply with providing US domestic products

3. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.
- The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:
1. To submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.
 2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination may results in rejection of the proposal.
 3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
 4. To furnish US domestic product for any waiver request that the FAA rejects.
 5. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of components and subcomponents produced in the United States is more that 60% of the cost of all components and subcomponents of the “facility”. The required documentation for a type 3 waiver is:

- a) Listing of all manufactured products that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety)
- b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly and installation at project location.
- c) Percentage of non-domestic component and subcomponent cost as compared to total “facility” component and subcomponent costs, excluding labor costs associated with final assembly and installation at project location.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

- a) Detailed cost information for total project using US domestic product
- b) Detailed cost information for total project using non-domestic product

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date

Signature

Company Name

Title

* * * * *

Certificate of Buy American Compliance for Manufactured Products

(Non-building construction projects, equipment acquisition projects)

As a matter of bid responsiveness, the bidder or offeror must complete, sign, date, and submit this certification statement with their proposal. The bidder or offeror must indicate how they intend to comply with 49 USC § 50101 by selecting one on the following certification statements. These statements are mutually exclusive. Bidder must select one or the other (not both) by inserting a checkmark (✓) or the letter "X".

- Bidder or offeror hereby certifies that it will comply with 49 USC § 50101 by:
- a) Only installing steel and manufactured products produced in the United States, or;
 - b) Installing manufactured products for which the FAA has issued a waiver as indicated by inclusion on the current FAA Nationwide Buy American Waivers Issued listing, or;
 - c) Installing products listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation Subpart 25.108.

By selecting this certification statement, the bidder or offeror agrees:

- 1. To provide to the Owner evidence that documents the source and origin of the steel and manufactured product.
- 2. To faithfully comply with providing US domestic product
- 3. To furnish US domestic product for any waiver request that the FAA rejects
- 4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

- The bidder or offeror hereby certifies it cannot comply with the 100% Buy American Preferences of 49 USC § 50101(a) but may qualify for either a Type 3 or Type 4 waiver under 49 USC § 50101(b). By selecting this certification statement, the apparent bidder or offeror with the apparent low bid agrees:

- 1. To the submit to the Owner within 15 calendar days of the bid opening, a formal waiver request and required documentation that support the type of waiver being requested.

2. That failure to submit the required documentation within the specified timeframe is cause for a non-responsive determination may result in rejection of the proposal.
3. To faithfully comply with providing US domestic products at or above the approved US domestic content percentage as approved by the FAA.
4. To refrain from seeking a waiver request after establishment of the contract, unless extenuating circumstances emerge that the FAA determines justified.

Required Documentation

Type 3 Waiver - The cost of the item components and subcomponents produced in the United States is more than 60% of the cost of all components and subcomponents of the "item". The required documentation for a type 3 waiver is:

- a) Listing of all product components and subcomponents that are not comprised of 100% US domestic content (Excludes products listed on the FAA Nationwide Buy American Waivers Issued listing and products excluded by Federal Acquisition Regulation Subpart 25.108; products of unknown origin must be considered as non-domestic products in their entirety)
- b) Cost of non-domestic components and subcomponents, excluding labor costs associated with final assembly at place of manufacture.
- c) Percentage of non-domestic component and subcomponent cost as compared to total "item" component and subcomponent costs, excluding labor costs associated with final assembly at place of manufacture.

Type 4 Waiver – Total cost of project using US domestic source product exceeds the total project cost using non-domestic product by 25%. The required documentation for a type 4 of waiver is:

- a) Detailed cost information for total project using US domestic product
- b) Detailed cost information for total project using non-domestic product

False Statements: Per 49 USC § 47126, this certification concerns a matter within the jurisdiction of the Federal Aviation Administration and the making of a false, fictitious or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code.

Date

Signature

Company Name

Title

6. CIVIL RIGHTS - GENERAL.

(Reference: 49 USC § 47123)

GENERAL CIVIL RIGHTS PROVISIONS

The contractor agrees that it will comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance.

This provision binds the contractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

This provision also obligates the tenant/concessionaire/lessee or its transferee for the period during which Federal assistance is extended to the airport through the Airport Improvement Program, except where Federal assistance is to provide, or is in the form of personal property; real property or interest therein; structures or improvements thereon.

In these cases the provision obligates the party or any transferee for the longer of the following periods:

(a) the period during which the property is used by the airport sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits; or

(b) the period during which the airport sponsor or any transferee retains ownership or possession of the property.

7. CIVIL RIGHTS – TITLE VI ASSURANCES.

7.1.1. Title VI Solicitation Notice

(Source: Appendix 4 of FAA Order 1400.11, Nondiscrimination in Federally-Assisted Programs at the Federal Aviation Administration)

Title VI Solicitation Notice:

The **State of Maine**, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, or national origin in consideration for an award.

7.1.2. Title VI Clauses for Compliance with Nondiscrimination Requirements

(Source: Appendix A of Appendix 4 of FAA Order 1400.11, Nondiscrimination in Federally-Assisted Programs at the Federal Aviation Administration)

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the **Title VI List of Pertinent Nondiscrimination Statutes and Authorities**, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.
2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.
3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor’s obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.
4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.
5. **Sanctions for Noncompliance:** In the event of a contractor’s noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:
 - a. Withholding payments to the contractor under the contract until the contractor complies; and/or

- b. Cancelling, terminating, or suspending a contract, in whole or in part.
6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

7.1.3. Title VI List of Pertinent Nondiscrimination Authorities

(Source: Appendix E of Appendix 4 of FAA Order 1400.11, Nondiscrimination in Federally-Assisted Programs at the Federal Aviation Administration)

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the “contractor”) agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms “programs or activities” to include all of the programs or activities of the Federal-aid recipients,

sub-recipients and contractors, whether such programs or activities are Federally funded or not);

- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration’s Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

8. CLEAN AIR AND WATER POLLUTION CONTROL.

(Reference: 49 CFR § 18.36(i)(12)) Note, when the DOT adopts 2 CFR 200, this reference will change to 2 CFR § 200 Appendix II(G))

CLEAN AIR AND WATER POLLUTION CONTROL

Contractors and subcontractors agree:

1. That any facility to be used in the performance of the contract or subcontract or to benefit from the contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities;
2. To comply with all the requirements of Section 114 of the Clean Air Act, as amended, 42 U.S.C. 1857 et seq. and Section 308 of the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308 of the Acts, respectively, and all other regulations and guidelines issued thereunder;
3. That, as a condition for the award of this contract, the contractor or subcontractor will notify the awarding official of the receipt of any communication from the EPA indicating that a facility to be used

for the performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities;

4. To include or cause to be included in any construction contract or subcontract which exceeds \$100,000 the aforementioned criteria and requirements.

9. CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS.

(Reference: 2 CFR § 200 Appendix II (E))

CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS

1. Overtime Requirements.

No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic, including watchmen and guards, in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

1. Violation; Liability for Unpaid Wages; Liquidated Damages.

In the event of any violation of the clause set forth in paragraph (1) above, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph 1 above, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1 above.

2. Withholding for Unpaid Wages and Liquidated Damages.

The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any monies payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph 2 above.

3. Subcontractors.

The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraphs 1 through 4 and also a clause requiring the subcontractor to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1 through 4 of this section.

10. COPELAND “ANTI-KICKBACK” ACT

(Reference: 2 CFR § 200 Appendix II(D), 29 CFR parts 3 & 5)

The United States Department of Labor Wage and Hours Division oversees the Copeland “Anti-Kickback” Act requirements. All contracts and subcontracts must meet comply with the Occupational Safety and Health Act of 1970.

United States Department of Labor Wage and Hours Division can provide information regarding any specific clauses or assurances pertaining to the Copeland “Anti-Kickback” Act requirements required to be inserted in solicitations, contracts or subcontracts.

11. DAVIS-BACON REQUIREMENTS.

(Reference: 2 CFR § 200 Appendix II(D))

DAVIS-BACON REQUIREMENTS

1. Minimum Wages

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided*, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the

Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2 Withholding.

The Federal Aviation Administration or the Sponsor shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, the Federal Aviation Administration may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly

transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Federal Aviation Administration if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i) and that such information is correct and complete;

(2) That each laborer and mechanic (including each helper, apprentice and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying or transcription by authorized representatives of the Sponsor,

the Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually

registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance With Copeland Act Requirements.

The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a)(1) through (10) and such other clauses as the Federal Aviation Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance With Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6 and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

12. DEBARMENT AND SUSPENSION (NON-PROCUREMENT).

(Reference: 2 CFR part 180 (Subpart C), 2 CFR part 1200, DOT Order 4200.5 DOT Suspension & Debarment Procedures & Ineligibility)

CERTIFICATE REGARDING DEBARMENT AND SUSPENSION (BIDDER OR OFFEROR)

By submitting a bid/proposal under this solicitation, the bidder or offeror certifies that at the time the bidder or offeror submits its proposal that neither it nor its principals are presently debarred or suspended by any Federal department or agency from participation in this transaction.

CERTIFICATION REGARDING DEBARMENT AND SUSPENSION (SUCCESSFUL BIDDER REGARDING LOWER TIER PARTICIPANTS)

The successful bidder, by administering each lower tier subcontract that exceeds \$25,000 as a "covered transaction", must verify each lower tier participant of a "covered transaction" under the project is not presently debarred or otherwise disqualified from participation in this federally assisted project. The successful bidder will accomplish this by:

1. Checking the System for Award Management at website: <http://www.sam.gov>
2. Collecting a certification statement similar to the Certificate Regarding Debarment and Suspension (Bidder or Offeror), above.

3. Inserting a clause or condition in the covered transaction with the lower tier contract

If the FAA later determines that a lower tier participant failed to tell a higher tier that it was excluded or disqualified at the time it entered the covered transaction, the FAA may pursue any available remedy, including suspension and debarment.

13. **DISADVANTAGED BUSINESS ENTERPRISE.**

(Reference: 49 CFR part 26)

DISADVANTAGED BUSINESS ENTERPRISES

Contract Assurance (§ 26.13) - The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy, as the recipient deems appropriate.

Prompt Payment (§26.29)- The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than {specify number} days from the receipt of each payment the prime contractor receives from {Name of recipient}. The prime contractor agrees further to return retainage payments to each subcontractor within {specify the same number as above} days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the {Name of Recipient}. This clause applies to both DBE and non-DBE subcontractors.

14. **ENERGY CONSERVATION REQUIREMENTS.**

(Reference 2 CFR § 200 Appendix II(H))

ENERGY CONSERVATION REQUIREMENTS

The contractor agrees to comply with mandatory standards and policies relating to energy efficiency that are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Public Law 94-163).

15. **EQUAL OPPORTUNITY CLAUSE AND SPECIFICATIONS.**

(Reference 41 CFR § 60-1.4, Executive Order 11246)

EQUAL OPPORTUNITY CLAUSE

During the performance of this contract, the contractor agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their

race, color, religion, sex, or national origin. such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency

the contractor may request the United States to enter into such litigation to protect the interests of the United States.

STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS

1. As used in these specifications:

a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

d. "Minority" includes:

(1) Black (all) persons having origins in any of the Black African racial groups not of Hispanic origin);

(2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);

(3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

(4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors

or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The contractor shall implement the specific affirmative action standards provided in paragraphs 18.7a through 18.7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the contractor has a collective bargaining agreement to refer either minorities or women shall excuse the contractor's obligations under these specifications, Executive Order 11246 or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the contractor during the training period and the contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the contractor's employees are assigned to work. The contractor, where possible, will assign two or more women to each construction project. The contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

- c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.
- d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.
- e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.
- f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
- g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such a superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
- h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.
- i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment

needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (18.7a through 18.7p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 18.7a through 18.7p of these specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the contractor. The obligation to comply, however, is the contractor's and failure of such a group to fulfill an obligation shall not be a defense for the contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the contractor has achieved its goals for women generally,) the contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 18.7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

16. FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

(Reference: 29 USC § 201, et seq.)

All contracts and subcontracts that result from this solicitation incorporate the following provisions by reference, with the same force and effect as if given in full text. The contractor has full responsibility to monitor compliance to the referenced statute or regulation. The contractor must address any claims or disputes that pertain to a referenced requirement directly with the Federal Agency with enforcement responsibilities.

Requirement	Federal Agency with Enforcement Responsibilities
Federal Fair Labor Standards Act (29 USC 201)	U.S. Department of Labor – Wage and Hour Division

17. LOBBYING AND INFLUENCING FEDERAL EMPLOYEES.

(Reference: 49 CFR part 20, Appendix A)

LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

The bidder or offeror certifies by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

- 1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the bidder or offeror, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
- 2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

18. NONSEGREGATED FACILITIES REQUIREMENT.

(Reference: 41 CFR § 60-1.8)

NOTICE OF NONSEGREGATED FACILITIES REQUIREMENT

Notice to Prospective Federally Assisted Construction Contractors

1. A Certification of Non-segregated Facilities shall be submitted prior to the award of a federally-assisted construction contract exceeding \$10,000 which is not exempt from the provisions of the Equal Opportunity Clause.
2. Contractors receiving federally-assisted construction contract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause.
3. The penalty for making false statements in offers is prescribed in 18 U.S.C. § 1001.

Notice to Prospective Subcontractors of Requirements for Certification of Non-Segregated Facilities

1. A Certification of Non-segregated Facilities shall be submitted prior to the award of a subcontract exceeding \$10,000, which is not exempt from the provisions of the Equal Opportunity Clause.
2. Contractors receiving subcontract awards exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed \$10,000 and are not exempt from the provisions of the Equal Opportunity Clause.
3. The penalty for making false statements in offers is prescribed in 18 U.S.C. § 1001.

CERTIFICATION OF NONSEGREGATED FACILITIES

The federally-assisted construction contractor certifies that she or he does not maintain or provide, for his employees, any segregated facilities at any of his establishments and that she or he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The federally-assisted construction contractor certifies that she or he will not maintain or provide, for his employees, segregated facilities at any of his establishments and that she or he will not permit his employees to perform their services at any location under his control where segregated facilities are maintained. The federally-assisted construction contractor agrees that a breach of this certification is a violation of the Equal Opportunity Clause in this contract.

As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms, and washrooms, restaurants and other eating areas, time clocks, locker rooms and other

storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directives or are, in fact, segregated on the basis of race, color, religion, or national origin because of habit, local custom, or any other reason. The federally-assisted construction contractor agrees that (except where she or he has obtained identical certifications from proposed subcontractors for specific time periods) she or he will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding \$10,000 which are not exempt from the provisions of the Equal Opportunity Clause and that she or he will retain such certifications in his files.

19. OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

(Reference 20 CFR part 1910)

All contracts and subcontracts that result from this solicitation incorporate the following provisions by reference, with the same force and effect as if given in full text. The contractor has full responsibility to monitor compliance to the referenced statute or regulation. The contractor must address any claims or disputes that pertain to a referenced requirement directly with the Federal Agency with enforcement responsibilities.

Requirement	Federal Agency with Enforcement Responsibilities
Occupational Safety and Health Act of 1970 (20 CFR Part 1910)	U.S. Department of Labor – Occupational Safety and Health Administration

20. RIGHT TO INVENTIONS.

(Reference 2 CFR § 200 Appendix II(F))

RIGHTS TO INVENTIONS

All rights to inventions and materials generated under this contract are subject to requirements and regulations issued by the FAA and the Sponsor of the Federal grant under which this contract is executed.

21. TERMINATION OF CONTRACT.

(Reference 2 CFR § 200 Appendix II(B))

TERMINATION OF CONTRACT

a. The Sponsor may, by written notice, terminate this contract in whole or in part at any time, either for the Sponsor's convenience or because of failure to fulfill the contract obligations. Upon receipt of such notice services must be immediately discontinued (unless the notice directs otherwise) and all materials as may have been accumulated in performing this contract, whether completed or in progress, delivered to the Sponsor.

- b. If the termination is for the convenience of the Sponsor, an equitable adjustment in the contract price will be made, but no amount will be allowed for anticipated profit on unperformed services.
- c. If the termination is due to failure to fulfill the contractor's obligations, the Sponsor may take over the work and prosecute the same to completion by contract or otherwise. In such case, the contractor is liable to the Sponsor for any additional cost occasioned to the Sponsor thereby.
- d. If, after notice of termination for failure to fulfill contract obligations, it is determined that the contractor had not so failed, the termination will be deemed to have been effected for the convenience of the Sponsor. In such event, adjustment in the contract price will be made as provided in paragraph 2 of this clause.
- e. The rights and remedies of the sponsor provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

22. TEXTING WHEN DRIVING

(References: Executive Order 13513, and DOT Order 3902.10)

TEXTING WHEN DRIVING

In accordance with Executive Order 13513, "Federal Leadership on Reducing Text Messaging While Driving" (10/1/2009) and DOT Order 3902.10 "Text Messaging While Driving" (12/30/2009), FAA encourages recipients of Federal grant funds to adopt and enforce safety policies that decrease crashes by distracted drivers, including policies to ban text messaging while driving when performing work related to a grant or sub-grant.

The Contractor must promote policies and initiatives for employees and other work personnel that decrease crashes by distracted drivers, including policies to ban text messaging while driving. The Contractor must include these policies in each third party subcontract involved on this project.

23. TRADE RESTRICTION

(Reference: 49 CFR part 30)

TRADE RESTRICTION CLAUSE

The contractor or subcontractor, by submission of an offer and/or execution of a contract, certifies that it:

- a. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);
- b. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;

c. has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

Unless the restrictions of this clause are waived by the Secretary of Transportation in accordance with 49 CFR 30.17, no contract shall be awarded to a contractor or subcontractor who is unable to certify to the above. If the contractor knowingly procures or subcontracts for the supply of any product or service of a foreign country on said list for use on the project, the Federal Aviation Administration may direct through the Sponsor cancellation of the contract at no cost to the Government.

Further, the contractor agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The contractor may rely on the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

The contractor shall provide immediate written notice to the sponsor if the contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances. The subcontractor agrees to provide written notice to the contractor if at any time it learns that its certification was erroneous by reason of changed circumstances.

This certification is a material representation of fact upon which reliance was placed when making the award. If it is later determined that the contractor or subcontractor knowingly rendered an erroneous certification, the Federal Aviation Administration may direct through the Sponsor cancellation of the contract or subcontract for default at no cost to the Government.

Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render, in good faith, the certification required by this provision. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

This certification concerns a matter within the jurisdiction of an agency of the United States of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

24. VETERAN'S PREFERENCE

(Reference: 49 USC § 47112(c))

VETERAN'S PREFERENCE

In the employment of labor (except in executive, administrative, and supervisory positions), preference must be given to Vietnam era veterans, Persian Gulf veterans, Afghanistan-Iraq war veterans, disabled veterans, and small business concerns owned and controlled by disabled veterans as defined in Title 49 United States Code, Section 47112. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

AIRPORT IMPROVEMENT PROGRAM SAFETY/PHASING PLAN CHECKLIST

Airport Name/Associated City	State	AIP No.	Date
------------------------------	-------	---------	------

Checklist for Airport Sponsor	N/A	Included		N/A	Included
1. Scope of work to be performed, including proposed duration of work	<input type="checkbox"/>	<input type="checkbox"/>	16. Procedures for notifying ARFF personnel about deactivated water lines or fire hydrants or blocked/rerouted emergency access routes	<input type="checkbox"/>	<input type="checkbox"/>
2. Runway and taxiway marking and lighting	<input type="checkbox"/>	<input type="checkbox"/>	17. Emergency notification procedures for medical and police response	<input type="checkbox"/>	<input type="checkbox"/>
3. Procedures for protecting runway and taxiway safety areas	<input type="checkbox"/>	<input type="checkbox"/>	18. Use of temporary visual aids	<input type="checkbox"/>	<input type="checkbox"/>
4. Procedures for protecting obstacle-free zones (OFZs), object free areas (OFAs), and threshold citing criteria	<input type="checkbox"/>	<input type="checkbox"/>	19. Wildlife management	<input type="checkbox"/>	<input type="checkbox"/>
5. Affected areas and operations, including possible safety problems	<input type="checkbox"/>	<input type="checkbox"/>	20. Foreign object debris (FOD) control provisions	<input type="checkbox"/>	<input type="checkbox"/>
6. NAVAIDs that could be affected	<input type="checkbox"/>	<input type="checkbox"/>	21. Hazardous material (HAZMAT) management	<input type="checkbox"/>	<input type="checkbox"/>
7. Methods of separating vehicle and pedestrian construction traffic from airport movement areas	<input type="checkbox"/>	<input type="checkbox"/>	22. NOTAM issuance	<input type="checkbox"/>	<input type="checkbox"/>
8. Procedures and equipment to delineate closed construction areas from airport operational areas	<input type="checkbox"/>	<input type="checkbox"/>	23. Inspection requirements	<input type="checkbox"/>	<input type="checkbox"/>
9. Limitations on construction	<input type="checkbox"/>	<input type="checkbox"/>	24. Procedures for locating and protecting existing underground utilities/facilities in excavation areas	<input type="checkbox"/>	<input type="checkbox"/>
10. Required compliance of contractor personnel with airport safety and security measures	<input type="checkbox"/>	<input type="checkbox"/>	25. Emergency procedures for contacting responsible representatives of all involved parties, including Airway Facilities personnel	<input type="checkbox"/>	<input type="checkbox"/>
11. Location of stockpiled construction materials	<input type="checkbox"/>	<input type="checkbox"/>	26. Vehicle operator training	<input type="checkbox"/>	<input type="checkbox"/>
12. Location of construction site parking and access and haul roads	<input type="checkbox"/>	<input type="checkbox"/>	27. Penalty provisions for noncompliance with airport rules and regulations and the safety plan	<input type="checkbox"/>	<input type="checkbox"/>
13. Radio communications	<input type="checkbox"/>	<input type="checkbox"/>	28. Special conditions that affect airport operation and will require a portion of the safety plan to be activated	<input type="checkbox"/>	<input type="checkbox"/>
14. Vehicle Identification	<input type="checkbox"/>	<input type="checkbox"/>	29. Notification to airport users	<input type="checkbox"/>	<input type="checkbox"/>
15. Trenches and excavations and cover requirements	<input type="checkbox"/>	<input type="checkbox"/>	30. Safety plan includes phasing sub-plans	<input type="checkbox"/>	<input type="checkbox"/>

Airport Sponsor certifies that the attached safety plan was developed in accordance with AC 5370-2E.

Certified by _____ and submitted to FAA on _____
Airport Sponsor Date

Comments, special conditions, others.

FAA Approval Signature

N/A For Part 139 airports, attached safety plan reviewed by:

 FAA Project Manager Date

 FAA Airport Certification Safety Inspector Date



U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: Standards for Airport Markings

Date: 9/27/2013

AC No: 150/5340-1L

Initiated by: AAS-100

Change:

1. What is the purpose of this advisory circular (AC)?

This advisory circular (AC) contains the Federal Aviation Administration (FAA) standards for markings used on airport runways, taxiways, and aprons.

2. Does this AC cancel any prior ACs?

This AC cancels AC 150/5340-1K, Standards for Airport Markings, dated September 3, 2010.

3. To whom does this AC apply?

The FAA recommends the guidelines and standards contained herein for the marking of airport runways, taxiways, and aprons. The use of these standards is the only method of compliance with the marking of runways, taxiways, and aprons for airports certificated under Title 14 Code of Federal Regulations Part 139, Certification of Airports (Part 139). These standards are to be used on all new airport projects that are under development and are to be implemented at all Part 139 certificated airports. Further, use of this AC is mandatory for all projects funded with federal grant monies through the Airport Improvement Program (AIP) and/or with revenue from the Passenger Facility Charge (PFC) Program. (See Grant Assurance No. 34, Policies, Standards, and Specifications, and PFC Assurance No. 9, Standards and Specifications.)

4. What are the principal changes in this AC? Changes are reflected by vertical bars located in the margins. This Revision:

a. Clarifies that runway surface markings on light colored pavement require black borders and glass beads (see paragraph [1.4](#)). Airports certificated under Title 14 of the Code of Federal Regulations, Part 139, Certification of Airports, must meet these requirements within two years from the effective date of this AC.

b. Expanded and illustrated the removal of markings discussion (see paragraph [1.3.f](#)).

c. Re-emphasizes that taxiway edge markings at entrance taxiways to a runway, including paved NO TAXI Islands are only to use dual continuous edge lines and not dual dashed edge lines (see paragraph [4.4.a](#)). Airports certificated under Title 14 of the Code of Federal Regulations, Part 139, Certification of Airports, can meet the requirements upon the next repainting project.

d. Adds a new paragraph 4.12 for ramp control markings in use by the industry and air/ramp controllers which supplements existing guidance in paragraph 4.9, Surface Painted Apron Entrance Point Signs. Note, as in this paragraph, the terms “apron” and “ramp” are used interchangeably throughout this AC. The meaning is the same. Airports certificated under Title 14 of the Code of Federal Regulations, Part 139, Certification of Airports, can meet the requirements upon the next repainting project.

e. Replaces previous references to Airport Reference Code (ARC) with Runway Design Code (RDC) and Airplane Design Groups (ADG) with Taxiway Design Groups (TDG) for taxiway designs per revised AC 150/5300-13A, Airport Design. Taxiways marked according to previous standards based on Airplane Design Groups may retain their present marking schemes until such time as the taxiway is otherwise modified under Taxiway Design Group standards. The change in design concepts principally affects taxiway fillets.

f. Placed existing Figures 1-25 and new Figure A-5 within new Appendix A. Re-lettered old Appendices A, B and C as new Appendix B, Appendix C, and Appendix D respectively, with no new figures.

g. Adds runway marking criteria per new Figure A-5 referenced by AC 150/5300-13A, Airport Design, for intersecting runways. Airports certificated under Title 14 of the Code of Federal Regulations, Part 139, Certification of Airports, can meet the requirements upon the next repainting project.

h. Clarifies that the intermediate holding position marking for taxiway/taxiway intersections interrupts the taxiway edge marking (see paragraph 3.6.d). Airports certificated under Title 14 of the Code of Federal Regulations, Part 139, Certification of Airports, must meet these requirements within three years from the effective date of this AC.

i. Revises guidance for intersections of ILS/MLS holding position markings and non-movement area boundary markings with taxiway edge markings (see paragraph 3.4.d and paragraph 5.4.e).

j. Adds hyperlinks to internal and external references (allowing the reader to access documents located on the internet and to maneuver within this document) that are provided throughout this document and are identified with underlined text. When navigating within this document, return to the previously viewed page by pressing the “ALT” and “←” keys simultaneously.

k. Other marking changes per this revision, such as Figure A-5 and paragraphs 2.6, 3.3(d)(1) and 3.6(d), can meet the requirements upon the next repainting project.

5. How to use this AC.

a. This AC includes color-coded text boxes to emphasize safety initiatives, solutions to painting difficulties, and general remarks.

(1) Green (Painting) – explains painting precautions and solutions, such as when proportioning is permissible for runway surface markings.

- (2) Red (Safety) – emphasizes safety initiatives.
- (3) Gray (General) – contains general remarks.

b. All references to other FAA ACs and Orders are interpreted as the current version.

c. Most figures in this advisory circular are full scale AutoCAD drawings saved as MS Word versions. For some figures, certain details may appear to be missing (missing or broken lines) when either printed or viewed on a computer monitor. To view all the details in these figures, use the appropriate ZOOM function. In some instances, where there is a large surface area, a ZOOM value of over 250% may be necessary to view all details. Both this advisory circular and the original AutoCAD files for all figures are available for download at the FAA web site:

http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.list/parentTopicID/85.

6. How are metrics represented?

Throughout this AC, customary English units are used followed with “soft” (rounded) conversion to metric units. The English units govern.

7. How can I get this and other FAA publications?

You can view a list of all ACs at http://www.faa.gov/regulations_policies/advisory_circulars/. You can view the Federal Aviation Regulations at http://www.faa.gov/regulations_policies/faa_regulations/.

Michael J. O'Donnell
Director of Airport Safety and Standards

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Chapter 1. Surface Markings for Airfield Pavements and Paved Airfield Roadways.

1.1. General.

This chapter provides the standards for surface markings used on paved airfield pavements (runways, taxiways, aprons) and paved airfield roadways. The standards for the surface markings assume that runways, taxiways, and aprons are built in accordance to the standard dimensions and layouts (e.g., clearances, fillets) in Advisory Circular (AC) 150/5300-13, Airport Design. The airport operator should expect difficulties when painting surface markings on non-standard infrastructure, such as a runway with a non-standard width. To assist airport operators, this advisory circular offers a few workable solutions for existing non-standard situations. Surface markings for large airplane parking positions and surface markings for unpaved airfield runways will be addressed at a future date in additional chapters.

Note: Use the zoom feature to view detail in any figure.

1.2. Definitions.

The following definitions apply to terms used in this AC.

- a.** Certified Airport. An airport that has been issued an Airport Operating Certificate by the FAA under the authority of 14 CFR Part 139, Certification of Airports.
- b.** Commercial Service Airports and Passenger Enplanements. Defined in FAA Order 5100.38, Airport Improvement Program Handbook.
- c.** Displaced Threshold. A threshold that is located at a point on the runway other than the designated beginning of the runway.
- d.** Island. An unused paved or grassy area between taxiways, between runways, or between a taxiway and a runway. Paved islands are clearly marked as unusable, either by painting or the use of artificial turf. For the purposes of this AC, islands are also referred to as “NO-TAXI” islands.
- e.** Movement Area. The runways, taxiways, and other areas of an airport that are used for taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and aircraft parking areas (reference 14 CFR Part 139).
- f.** Non-precision Runway. For the purposes of this AC, a runway end having an instrument approach procedure that provides course guidance without vertical path guidance. See AC 150/5300-13 for additional information.
- g.** Precision Runway. For the purposes of this AC, a runway end having an instrument approach procedure that provides course and vertical path guidance conforming to Instrument Landing System (ILS) or Microwave Landing System (MLS) precision approach standards in International Civil Aviation Organization (ICAO) Annex 10, Compliance Statement, Aeronautical Telecommunications. See AC 150/5300-13 for additional information about precision approaches.

h. Threshold. The beginning of that portion of the runway that is available for landing. In some instances, the landing threshold may not coincide with the end of the opposite direction runway (see paragraph 1.2.c).

i. Visual Runway. A runway end without an existing or planned (on the Airport Layout Plan) straight-in instrument approach procedure.

1.3. Surface marking practices.

The following subparagraphs address common practices used in airport markings.

a. In some situations, these standards may call for markings with different meanings to be installed close together. Ensure that sufficient space is left between such markings such that an observer will not be confused. **Note:** The taxiway edge marking and non-movement area marking never coincide. See paragraph 5.4.

b. Increasing the Friction Coefficient of Surface Markings. AC 150/5370-10, Standards for Specifying Construction of Airports, Item P-620, Runway and Taxiway Painting, provides airport operators information to increase the friction coefficient of surface markings. Common practices include the spreading of silica sand on the marked surface immediately after painting and the use of glass beads in the marking materials. Glass beads or silica sand are required when durable markings (epoxy and methylacrylate based paints) are used. These paints are usually applied at 18 to 30 mils in dry thickness.

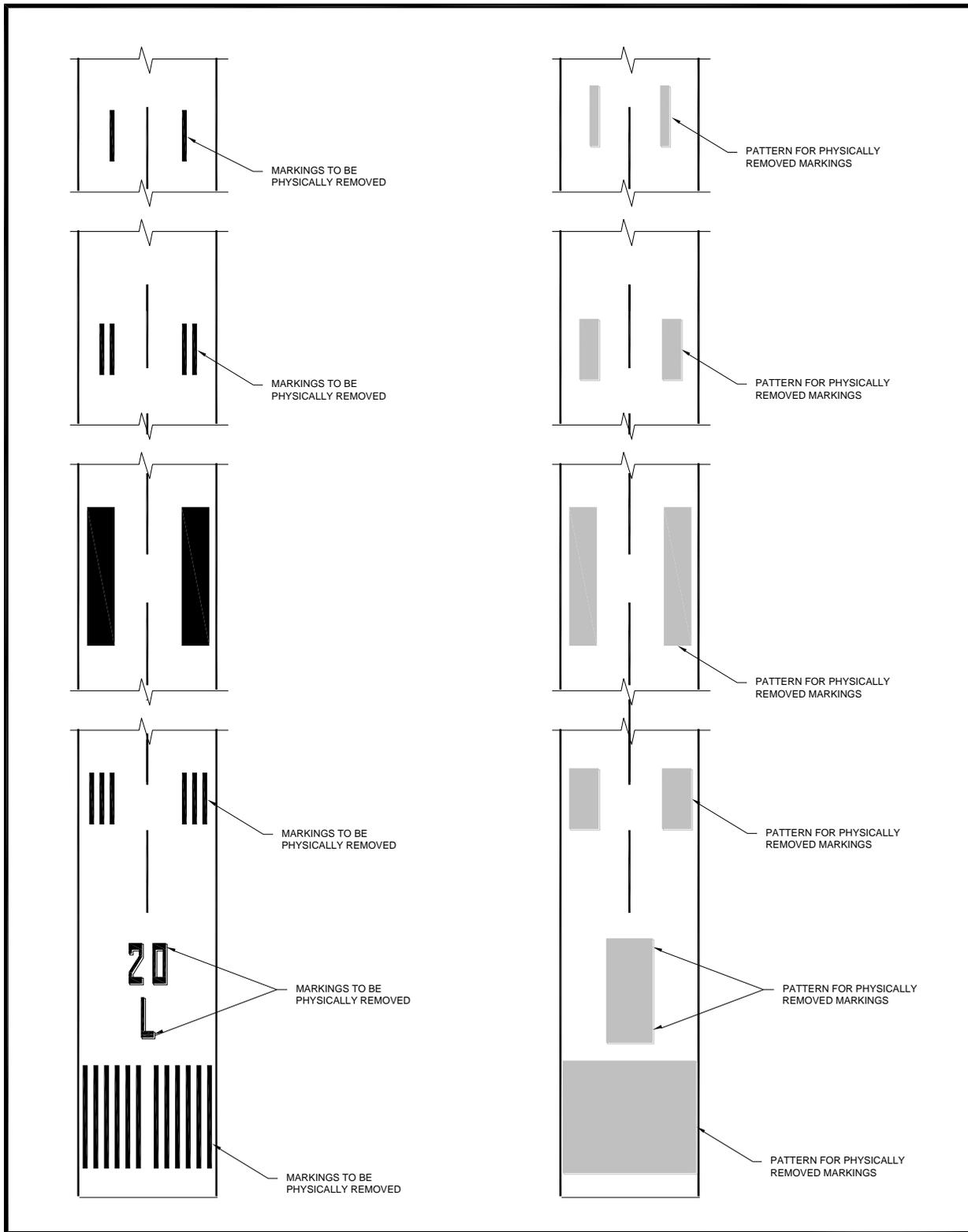
c. Paint Color Specifications, Requirements for Surface Preparation, Paint Application Rates and Methods, and Requirements for Preformed Thermal Plastic Markings. AC 150/5370-10 provides the paint color specifications, requirements for surface preparation, paint application rates, the various methods for applying paint, and the performance requirements for using only preformed thermoplastic markings. Precaution: Reflective tapes such as those commonly used for highways and city street applications are not to be used on the airside because of the potential for foreign object damage caused by loosened painted tape.

d. Striated Markings. Striated markings, which may be used in areas subject to frost heave, consist of painted stripes 4 inches (10 cm) to 8 inches (20 cm) in width that are separated by unpainted stripes. The width of the unpainted stripe may not exceed the width of the painted stripe. The width of the painted and unpainted stripes must be the same throughout the specific marking. Each edge of the marking must be a painted stripe. That is, a painted stripe is to begin and end within the width of the markings. Precaution: Because striated markings offer reduced visibility compared to non-striated markings, more frequent maintenance is required to maintain an acceptable level of visibility. Hence, striated markings are never used on Category II and Category III runways. The mixing of striated and non-striated markings is not permitted within a surface marking scheme. For example, in a 2-digit landing designator, one digit cannot be striated while the other is not. It is permitted to mix different marking schemes. For example, the landing designator is striated and the aiming point is not.

e. Temporary Markings. When selecting a material for temporary markings, consider the difficulty of removing the temporary marking when it is no longer needed. Some airports have had some success using water-based paint. Striated markings may also be used for

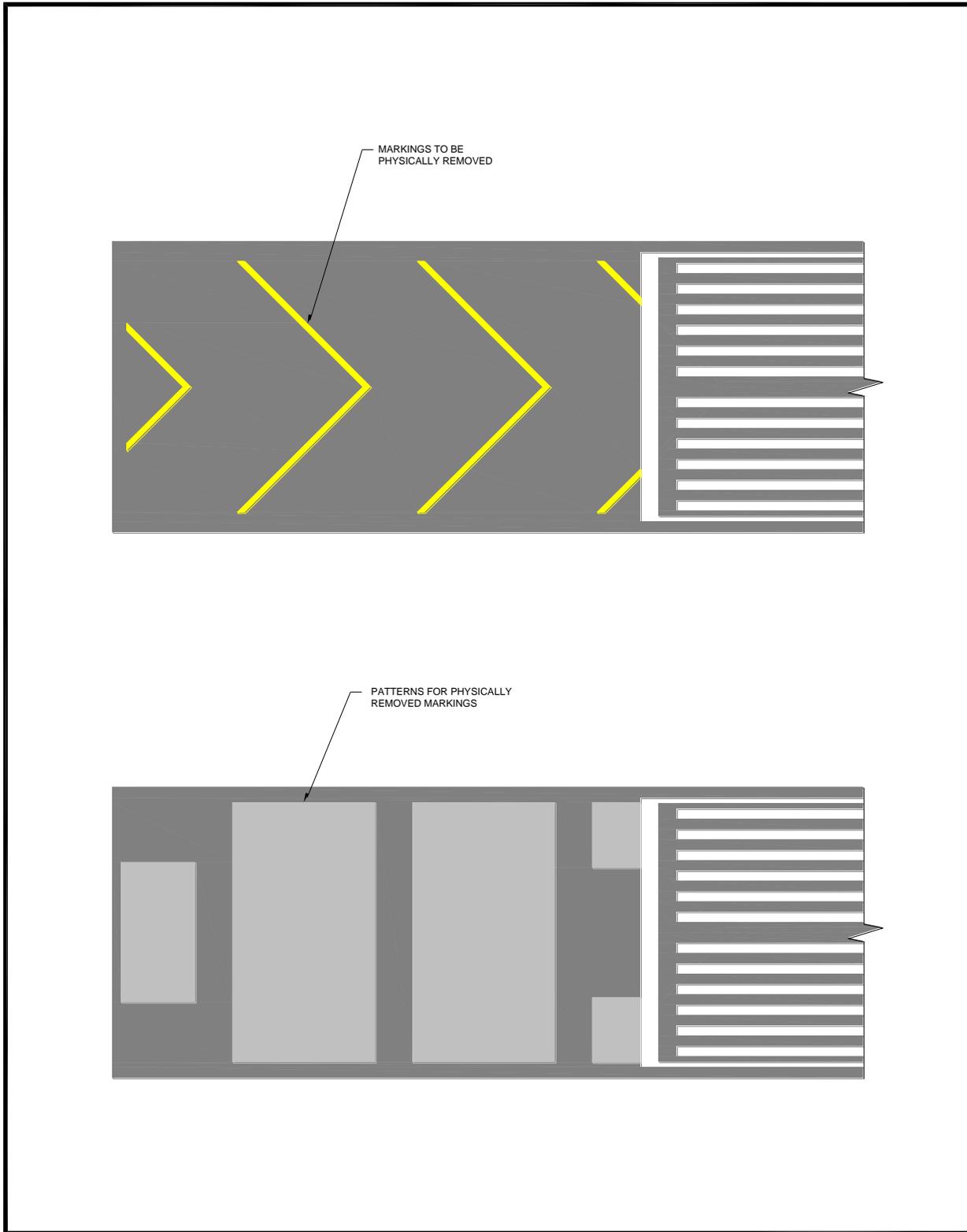
temporary markings, but they are never used to denote a closed runway or other closed pavement or for Category II or Category III runways.

f. Removal of Markings. Pavement markings that are no longer needed are not to be painted over but instead are to be physically removed. The FAA does not endorse painting over the old markings because this inadequate practice merely preserves the old marking which, in some cases, has misled pilots and required extra maintenance. Physical removal of markings is achieved by water blasting, shot blasting, sand blasting, chemical removal, or other acceptable means that do not harm the pavement. The physical removal of any old marking(s) must include a pre-determined larger size and shape of a removal area that encompasses the old marking(s) and by grouping adjacent markings together into a larger rectangular removal area. The rationale behind this practice is to eliminate the continued visual appearance of the removed marking(s). When a runway end or threshold is being moved, all of the markings that are being removed must be strikingly larger in size, grouped together with adjacent markings and be rectangular in shape. For example, use a single, larger rectangular removal area to encompass the entire runway designator 7 or 14L and provide a separate large rectangular area comprising all of the runway threshold markings along with a separate large rectangular area for the touchdown zone markings on the same side of the runway centerline. Also, the size and shape for the removal area for (1) Patterns A, B, and C holding position markings and (2) yellow arrow heads having a runway threshold bar or a runway demarcation bar must be much strikingly larger than the marking(s) being removed. For example, use a single, larger rectangular removal area to encompass all yellow arrow heads and the adjacent white runway threshold bar marking. See [Figure 1-1](#), [Figure 1-2](#), and [Figure 1-3](#) for examples of marking removal patterns.



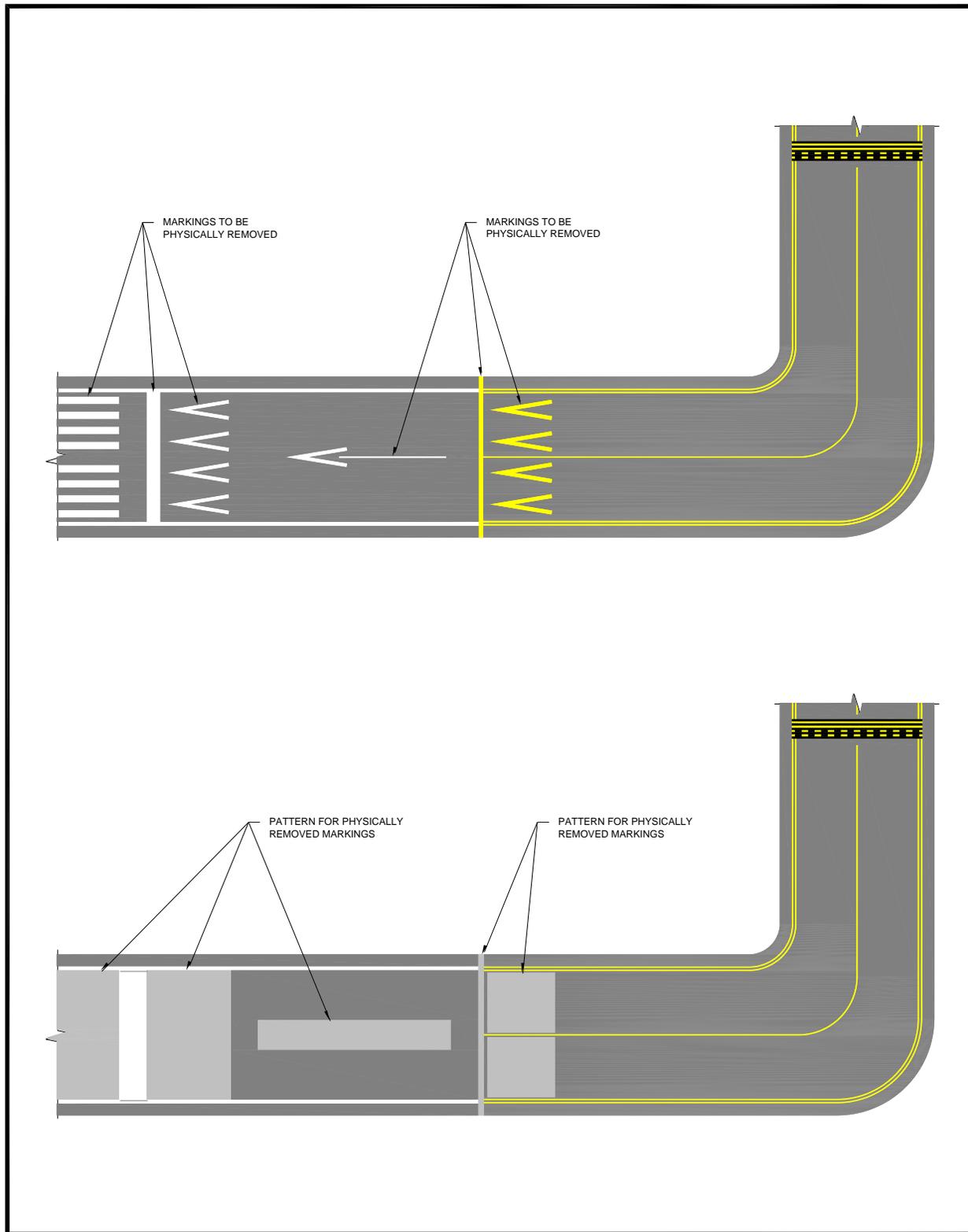
Note: For further details, see paragraph 1.3.f.

Figure 1-1. Example of marking removal patterns



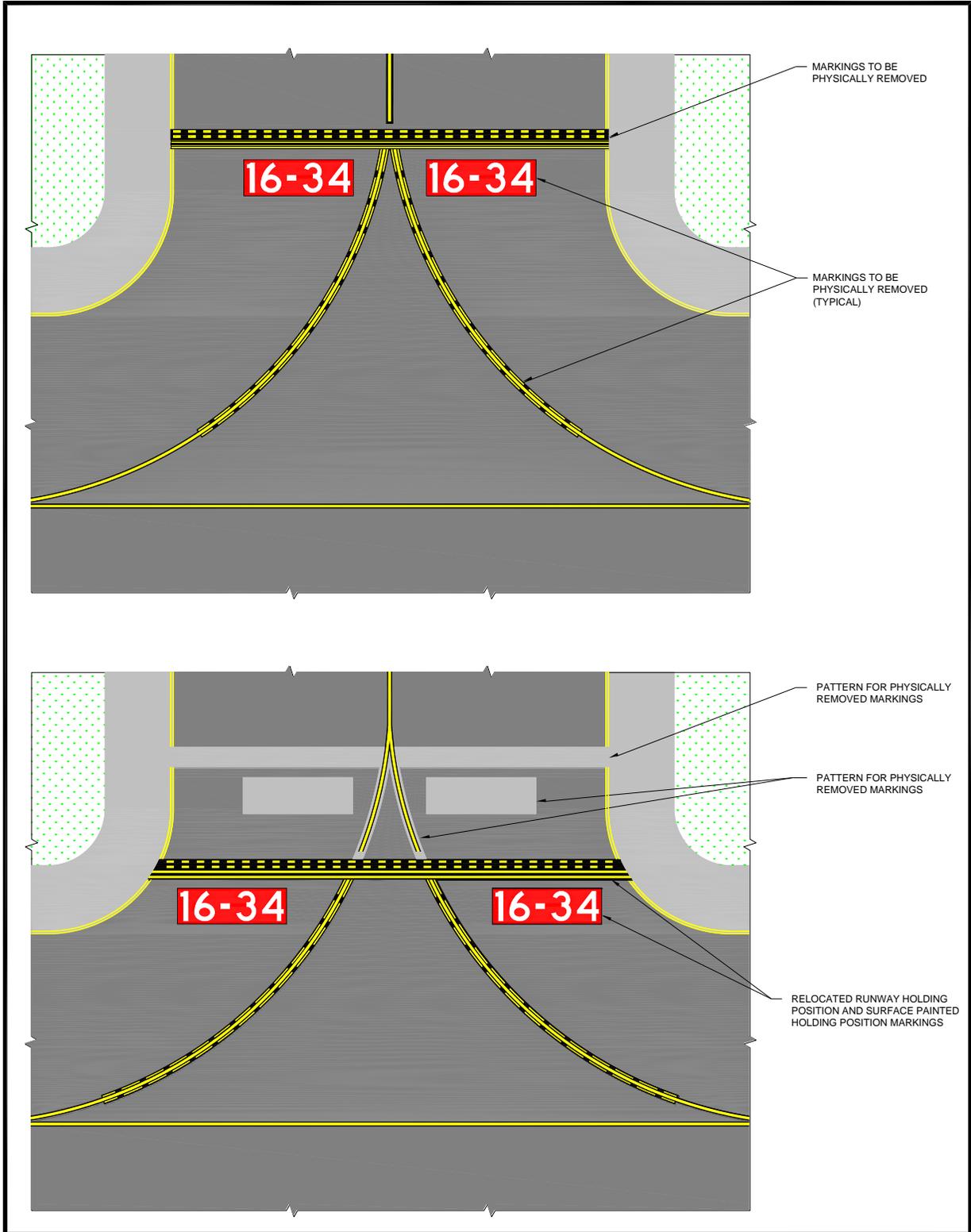
Note: For further details, see paragraph [1.3.f](#).

Figure 1-2. Example of marking removal patterns



Note: For further details, see paragraph [1.3.f](#).

Figure 1-3. Example of marking removal patterns



Note: For further details, see paragraph 1.3.f.

Figure 1-4. Example of marking removal patterns

g. Painted Numbering System for Record Keeping of Surface Painted Markings. To facilitate the daily inspection, scheduled maintenance, necessary repairs, etc. for surface markings the airport operator may use a numbering system or alphanumeric system that is located in a corner of the surface marking. Figure 1-5 shows a numbering system adopted by one airport for identifying each surface marking listed in their Sign Plan. If employed, the height of the inscription should be small and inconspicuous to all viewers except an individual standing next to the surface marking.

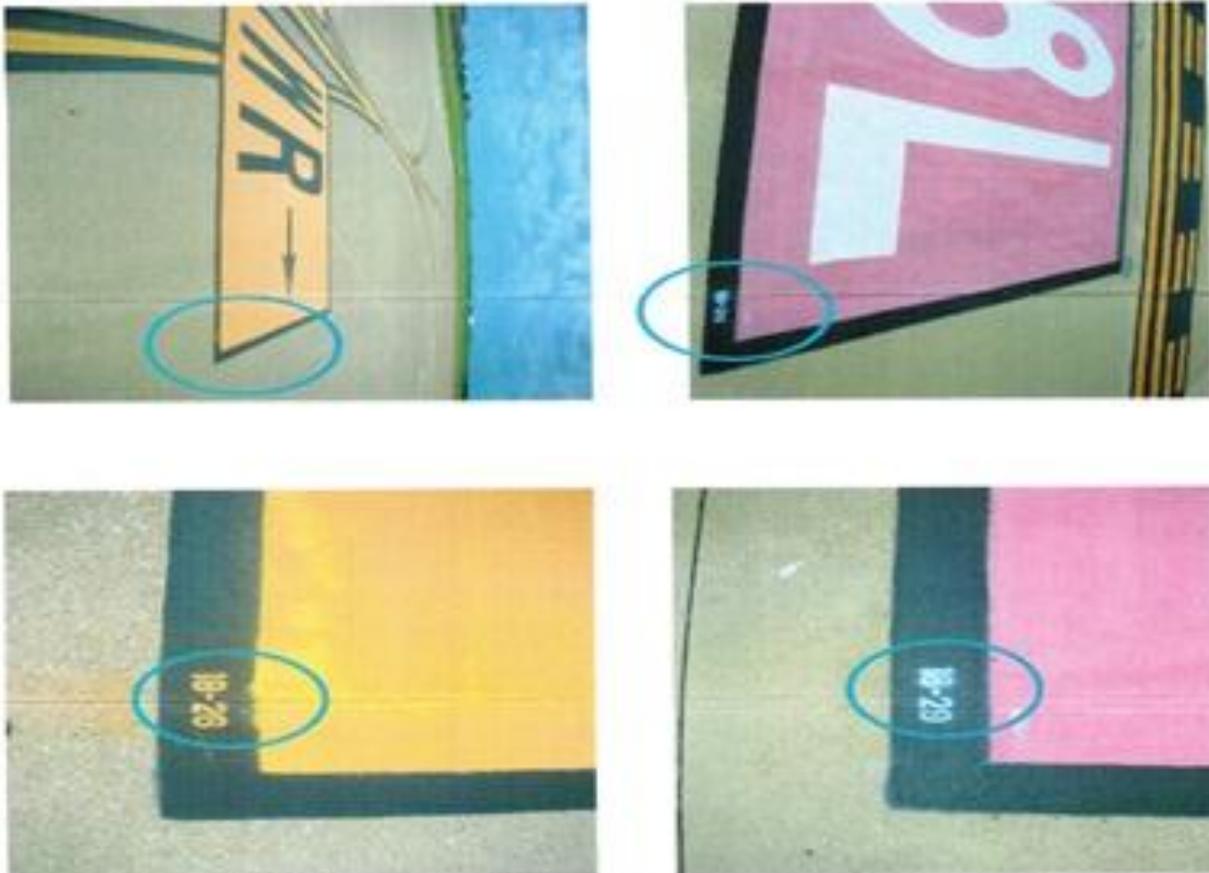


Figure 1-5. Example of painted numbering system for surface painted markings

1.4. Requirements and recommendations for enhanced conspicuity of surface markings on concrete pavements and light colored pavements.

Surface markings that cannot be seen by pilots and other individuals operating on paved airfield surfaces are ineffective. Two proven techniques that help airport operators enhance the conspicuity of surface markings are (1) outlining surface markings with black borders on concrete pavements and light-colored pavements and (2) placing glass beads in paint. However, glass beads are not to be used in black paint, including numerals and inscriptions found in Appendix B. Table 1-1 serves as a general guide for determining when existing asphalt concrete surfaces or asphalt treated surfaces may be classified as a light-colored pavement, i.e., when to outline a required surface marking with a black border.

Table 1-1. General guidelines for determining light-colored pavements

Painting a Black Border			
Pavement Surface Type	Age of Pavement Surface ¹		
	New	Up to 2 years old	Over 2 years old
Portland Cement Concrete	Yes	Yes	Yes
Asphalt Concrete	No	No	Yes
Asphalt Treated	No	No	Yes

Note 1: This table serves only as a general guide since an existing asphalt pavement at one airport location may not experience the same rate of surface color deterioration as at another airport location.

a. Technique 1 – Outlining Surface Markings with Black Borders on Concrete Pavements and Light-Colored Pavements. The degree of contrast (conspicuity) between surface markings on light-colored pavements, in particular on concrete pavements and older asphalt pavements, can be increased by outlining all edges of the surface marking with a black border. Appendix B provides illustrations of recommended patterns for various surface markings outlined in black. Black borders, except for enhanced taxiway centerline applications, are 6 inches (15 cm) or greater in width to enhance the conspicuity of certain painted surface markings on concrete pavements and light-colored pavements. The borders for the outside dashes of the enhanced taxiway centerline marking can range from 3 to 6 inches (7.5 to 15 cm). See Table 1-2 for surface markings that are required or recommended to have black borders.

(1) Surface Markings that Require Black Borders.

- (i) Runway centerline marking (per paragraph 2.4).
- (ii) Runway threshold marking (per paragraph 2.5).
- (iii) Runway displaced threshold marking (per paragraph 2.9).
- (iv) Runway threshold bar marking (per paragraph 2.9.a).
- (v) Runway aiming point marking (per paragraph 2.6).
- (vi) Runway landing designator marking (per paragraph 2.3).
- (vii) Runway touchdown zone markings (per paragraph 2.7).
- (viii) All holding position markings (per paragraphs 3.2, 3.3, 3.4, and 3.5) and the non-movement area boundary marking (per paragraph 5.4).
- (ix) Intermediate holding position marking for taxiway/taxiway intersections (per paragraph 3.6).

- (x) All taxiway centerline markings on taxi routes designated as surface movement guidance and control system (SMGCS) routes (per paragraph 4.2).
 - (xi) Enhanced taxiway centerline marking (per paragraph 4.3).
 - (xii) Surface painted holding position sign marking (per paragraph 4.5).
 - (xiii) Geographic position marking (per paragraph 4.11).
- (2) Surface Markings Recommended for Black Borders. This advisory circular strongly recommends outlining all other markings not listed paragraph 1.4.a(1), particularly taxiway centerlines per paragraph 4.2.

Table 1-2. Requirements and recommendations for black borders and glass beads

Marking	Black Border	Glass Beads
Runway centerline marking (per paragraph <u>2.4</u>).	Required	Required
Runway threshold marking (per paragraph <u>2.5</u>).	Required	Required
Runway displaced threshold marking (per paragraph <u>2.9</u>).	Required	Required
Runway threshold bar marking (per paragraph <u>2.9.a</u>).	Required	Required
Runway aiming point marking (per paragraph <u>2.6</u>).	Required	Required
Runway landing designator marking (per paragraph <u>2.3</u>).	Required	Required
Runway touchdown zone markings (per paragraph <u>2.7</u>).	Required	Required
Runway edge marking (per paragraph <u>2.8</u>).		Recommended
Runway demarcation bar marking (per paragraph <u>2.9.c</u>).		Recommended
All holding position markings (per paragraphs <u>3.2</u> , <u>3.3</u> , <u>3.4</u> , and <u>3.5</u>).	Required	Required
Intermediate holding position marking for taxiway/taxiway intersections (per paragraph <u>3.6</u>).	Required	
Taxiway centerline markings (per paragraph <u>4.2</u>).	Recommended	Required
All taxiway centerline markings on taxi routes designated as surface movement guidance and control system (SMGCS) routes (per paragraph <u>4.2</u>).	Required	Required
Enhanced taxiway centerline markings per paragraph <u>4.3</u> .	Required	Required
Taxiway edge marking (per paragraph <u>4.4</u>).		Recommended
Geographic position marking (per paragraph <u>4.11</u>).	Required	Required
Surface painted signs for holding position signs (paragraph <u>4.5</u>), taxiway direction signs (paragraph <u>4.6</u>), taxiway location signs (paragraph <u>4.7</u>), gate destination signs (paragraph <u>4.8</u>), and apron entrance point signs (paragraph <u>4.9</u>).	Required	Required
Non-movement area boundary marking (per paragraph <u>5.4</u>).	Required	Required
All other markings not listed paragraph <u>1.4.a(1)</u> .	Recommended	

b. Technique 2 – Use of Glass Beads on Permanent Pavement Markings. Glass beads identified in Item P-620 of AC 150/5370-10 are an effective means of enhancing the conspicuity of surface markings when aircraft and vehicles operate at night, during low-visibility

conditions, or when the pavement surface is wet. The glass beads used in the below applications should meet the specifications found in AC 150/5370-10, Item P-620. Due to the additional increase in marking conspicuity caused by certain glass beads, the FAA recommends that runway holding position markings contain either Type III or Type IV glass beads as determined by the airport operator. If Type IV glass beads that have a larger diameter are used, then they should only be applied in higher-built materials, such as TT-P-1952E-Type III waterborne paint, epoxy, methyl methacrylate, or preformed thermoplastic. Precaution: Glass beads should never be used in black paint, including numerals and inscriptions found in Appendix B. See Table 1-2 for surface markings that are required or recommended to have glass beads.

Glass Bead Requirement Per <u>AC 150/5370-10</u> , Paragraph 620-3.5, Application (General)
<p>“Glass beads shall be distributed upon the marked areas at the locations shown on the plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate(s) shown in Item P-620, Table 1 of <u>AC 150/5370-10</u>. Glass beads shall not be applied to black paint or green paint, including numerals and inscriptions found in <u>Appendix B</u>. Type III beads shall not be applied to red or pink paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment should be performed.”</p>

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Chapter 2. Surface Markings for Runways.

2.1. Application.

The minimum requirements for surface marking schemes used for runways are a direct function of the approach category for each runway threshold and the existence of displaced thresholds, stopways, blast pads, or extra wide shoulders. Runways having the same approach category off both runway thresholds will show the same surface marking scheme from threshold to threshold (with some exceptions, such as the runway designator.) In comparison, runways with different approach categories will show two different surface marking schemes. The complete runway surface marking schemes required by a runway combine Table 2-1 requirements with the physical structure, such as blast pads or stopways, and usage of the runway.

a. Table 2-1 identifies the minimum required surface marking schemes for paved runways according to their threshold approach category. Figure A-1, Figure A-2, Figure A-3, and Figure A-6 provide the dimensional standards for the surface marking schemes. An airport operator may paint a runway with additional surface marking schemes than required, such as a visual runway with runway edge markings or the aiming point marking, if deemed necessary by the FAA. Furthermore, surface markings beyond those described in Table 2-1 are required to support particular operations, such as a displaced threshold, or to identify runway related features, such as blast pads or stopways.

Table 2-1. Minimum required runway surface marking schemes for paved runways

Runway Surface Marking Scheme	Threshold Approach Category		
	Visual Approach	Non-precision Approach (and approaches with vertical guidance not lower than 3/4 -statute mile visibility)	Precision Approach (Approaches with lower than 3/4 -statute mile visibility)
Landing Designator (par. 2.3)	X	X	X
Centerline (par. 2.4)	X	X	X
Threshold Markings (par. 2.5)	Note 1	X	X
Aiming Point (par. 2.6)	Note 2	Note 3	X
Touchdown Zone (par. 2.7)			X
Edge Markings (par. 2.8)	Note 4	Note 4	X

Note 1: Required on runways serving approach categories C and D airplanes and for runways used, or intended to be used, by international commercial air transport.

Note 2: Required on 4,200-foot (1,280 m) or longer runways serving approach categories C and D airplanes.

Note 3: Required on 4,200-foot (1,280 m) or longer instrumented runways.

Note 4: Used when the full runway pavement width may not be available for use as a runway.

b. Runways with a displaced threshold, blast pad, stopway, or extra wide shoulders require additional marking schemes not identified in Table 2-1. These surface marking schemes and others not in Table 2-1 are discussed separately in this advisory circular. See AC 150/5300-13 for detailed information about the location of displaced thresholds, blast pads, and stopways.

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
(Painting)**

The dimensional size for the runway surface marking promulgated by this advisory circular is based on the assumption that the runway has a standard runway width as prescribed by AC 150/5300-13. For convenience, the standard widths are shown in Table 2-2, below.

Airport operators with non-standard runway widths may, for specified surface markings, proportionally adjust the marking's width to be less than the standard scheme. Under substandard conditions, the width of marking is in direct proportion to the available runway width. However, the corresponding length for the marking is never reduced.

Subsequent paragraphs in this advisory circular will specify, via a green-shaded solution box, those runway surface markings that may be proportioned. The absence of a green-shaded solution box in a subsequent paragraph implies that runway surface marking, such as the runway centerline, is not to be decreased in width even if other nearby runway surface markings are proportionally adjusted.

2.2. Interruption of runway surface markings.

At the intersection of two runways, the surface markings of one runway are, with the possible exception of runway edge markings (such as closed V-shaped runways), fully displayed through the intersection while the surface markings of the other runway are completely interrupted. This process of removing runway surface markings from one runway establishes an order of precedence among the different runways.

a. Order of Precedence. The order of precedence for displaying the runway surface marking schemes of one runway over the other runway at the intersection of these runways should follow this order:

- (1) Precision approach runway, Category III.
- (2) Precision approach runway, Category II.
- (3) Precision approach runway, Category I.
- (4) Non-precision approach runway.
- (5) Visual runway.

For an intersection of runways of the same precedence, the preferred higher precedence runway is the one having the lowest approach minimums or the runway end most often used.

b. Lesser Precedence Runways. The manner in which a lesser precedence runway intersects a higher precedence runway may require the shifting or complete removal of certain surface markings that fall within the intersection. As shown in Figure A-4, the most affected surface markings are the runway centerline, runway edge markings, aiming point markings, and

runway touchdown zone markings. The latter two runway markings may have implications when shifted or removed. See paragraphs [2.2.c](#) and [2.6](#) for shifting an aiming point marking, and see paragraph [2.7](#) for removing touchdown zone markings.

c. Consequences When Shifting the Aiming Point Markings. [Figure A-4](#) shows one possible conflict that could occur when the aiming point markings are relocated.

(1) When the aiming point markings of a given runway that are in the intersection of two runways need to be moved more than 200 feet (61 m) away from the existing threshold, the airport operator will have to displace the existing threshold or designate a new runway end (threshold) in order to retain the distance between the threshold and the aiming point marking as illustrated in the bottom illustration of [Figure A-4](#). The preferred distance to be maintained between the newly designated threshold and the shifted aiming point marking is 1,020 feet (311 m); see paragraph [2.6](#).

(2) Runways with an approach landing aid, such as Precision Approach Path Indicators (PAPIs) or Visual Approach Slope Indicators (VASIs), which are co-located with the aiming point markings, can be negatively affected when an excessive shifting of the aiming point marking occurs. The consequence could be a non-compatible threshold crossing height for landing airplanes. When the aiming point markings are shifted more than 60 feet (18.3 m), the co-located PAPI or VASI should be evaluated for relocation to provide a correct vertical guidance to pilots. See [AC 150/5340-30](#), Design and Installation Details for Airport Visual Aids, to determine if the impact of shifted aiming point markings warrants a relocation of the co-located PAPI (or other runway approach aids).

(3) For landing safety, the FAA requires that whenever the distance between the threshold and aiming point markings is 1,220 feet (372 m) or more, the airport operators place a note in the Airport/Facility Directory (A/FD) to inform pilots about the increased distance existing between the threshold and the aiming point markings.

d. Closed V-Shaped Runway Ends Configuration. The closed V-shaped runway ends configuration is a pavement geometry where two runway ends commence from the same location but proceed in different directions (see [Figure 2-1](#)). This undesirable geometry requires a special shifting procedure of the runway landing designator marking of the lesser precedence runway farther down the runway than prescribed by paragraph [2.3](#). The special procedure is as follows. On the lesser order runway, locate the point on its runway centerline that is perpendicular to the inside common corner of the two intersecting runways. Once this base point is located, move this base point 20 feet (6.5 m) down the runway centerline to relocate the bottom of the letter or number(s) used for the runway landing designator. For an intersection of runways of the same precedence, the preferred higher precedence runway is the one having the lowest approach minimums or the runway end most often used.

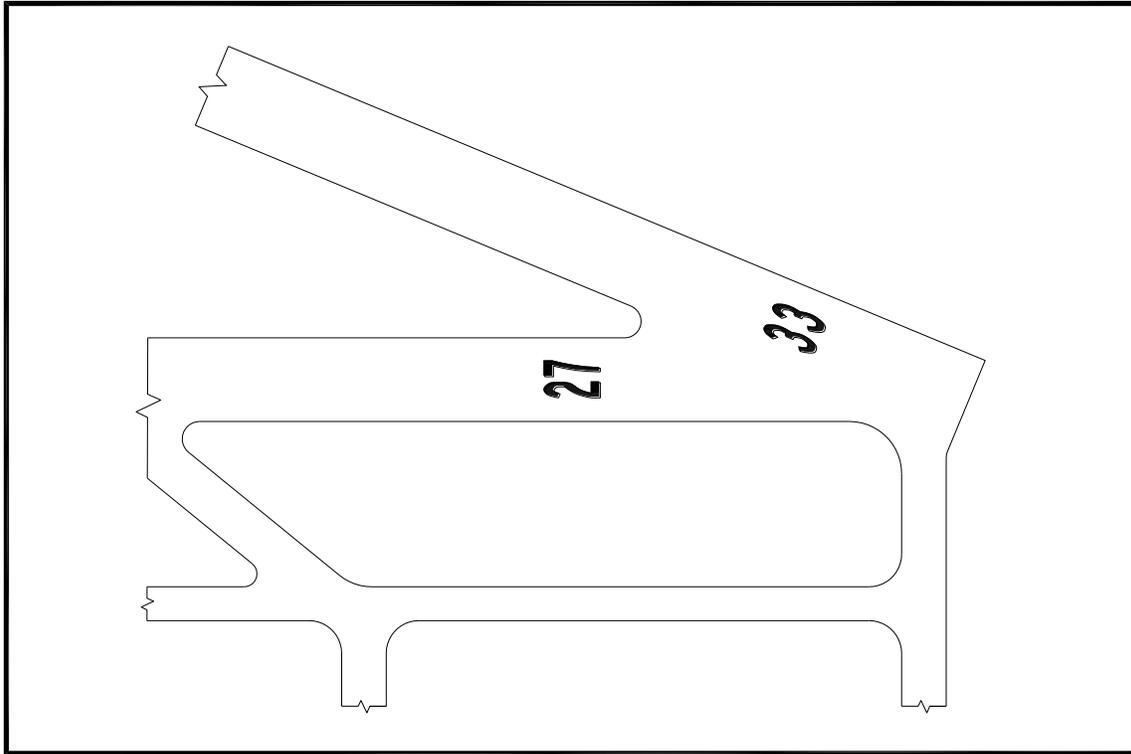


Figure 2-1. Closed V geometry

**Wrong-Runway Takeoffs Mitigation
(Safety)**

In an effort to eliminate the possibility of a “wrong-runway” takeoff operation by pilots, the airport operator should reconstruct closed V-shaped runway geometries to a different geometry, possibly an X-shaped geometry.

2.3. Runway landing designator marking.

- a. Purpose. The runway landing designator marking identifies a runway end.
- b. Requirement. See Table 2-1.
- c. Location. Runway landing designator marking(s) must be located from the runway threshold per Figure A-1, Figure A-2, Figure A-3, or from the displaced threshold per Figure A-8. All these figures show the start location for both types of thresholds.
- d. Color. Runway landing designator markings are white. See paragraph 1.4 for required and recommended techniques to enhance visibility of this surface marking.
- e. Characteristics.

(1) A runway landing designator marking consists of a number comprising one or two digits. When parallel runways exist, the number is further supplemented with a letter.

(2) A single-digit runway landing designation number is never preceded by a zero.

(3) For single runways, dual parallel runways, and triple parallel runways, the designator number is the whole number nearest the one-tenth of the magnetic azimuth along the runway centerline when viewed from the direction of approach. For example, where the magnetic azimuth along the runway centerline is 183 degrees, the runway designator marking would be 18; for a magnetic azimuth of 87 degrees, the runway designation marking would be 9. For a magnetic azimuth ending in the number “5” such as 185 degrees, the runway designator marking may be either 18 or 19.

(4) On four or more parallel runways, one set of adjacent runways is numbered to the nearest one-tenth of the magnetic azimuth and the other set of adjacent runways is numbered to the next nearest one-tenth of the magnetic azimuth.

(5) For parallel runways, each runway landing designator number must be supplemented by a letter, in the order shown from left to right when viewed from the direction of approach as prescribed by the following marking criteria. Different labeling patterns than those prescribed below are permissible under certain circumstances as identified in paragraph [2.3.e\(6\)](#)

(i) Two parallel runways having a magnetic azimuth of 182 degrees are designated “18L” and “18R.”

(ii) Three parallel runways having a magnetic azimuth of 87 degrees are designated “9L,” “9C,” and “9R.”

(iii) Four parallel runways having a magnetic azimuth of 324 degrees are designated “32L,” “32R,” “33L,” and “33R.”

(iv) Five parallel runways having a magnetic azimuth of 138 degrees are designated “13L,” “13R,” “14L,” “14C,” and “14R” or “14L,” “14R,” “13L,” “13C,” and “13R.” Other combinations exist for this case. See paragraph [2.3.e\(6\)](#).

(v) Six parallel runways having a magnetic azimuth of 83 degrees are designated “8L,” “8C,” “8R,” “9L,” “9C,” and “9R. See paragraph [2.3.e\(6\)](#).

(vi) Seven parallel runways having a magnetic azimuth of 85 degrees – the runways would be designated “8L,” “8C,” “8R,” “9L,” “9C,” “9R,” and “10.” Other combinations exist for this case. See paragraph [2.3.e\(6\)](#).

(6) There are certain runway placements where the surface marking schemes for parallel runways provided in paragraph [2.3.e\(5\)](#) may not be appropriate because their orientation may lead to pilot confusion. For example, the marking scheme recommended for parallel runways on the same side of a terminal is to follow paragraph [2.3.e\(5\)](#). However, when two parallel runways are separated by a large distance, as by a central terminal or several terminals, it is preferable to designate the runways as non-parallel runways to avoid pilot confusion. Another case that may cause pilot confusion is a turf runway that is parallel to paved visual runway but at a great distance from a higher precedence paved runway. In general, the

airport operator should carefully choose how to mark parallel runways to eliminate pilot confusion.

The appearance of the letters and numbers used for runway landing designator markings are in the form and proportion as shown in [Figure A-6](#). The spacing between numbers and letters are as shown in [Figure A-1](#), [Figure A-2](#), [Figure A-3](#), and [Figure A-6](#). However, with the exception of the numerals 6 and 9, all numerals and the letters L, C, and R are 60 feet (18.3 m) in height. Numerals 6 and 9, which are 63 feet (18.9 m) in height, follow the Rule of 69. That is, although the numerals 6 and 9 are taller, the 3-foot tips of the numerals are ignored so that their separations from the threshold markings, the letters L-C-R, the first runway centerline, and the start of the runway threshold remain as shown in [Figure A-1](#), [Figure A-2](#), and [Figure A-3](#).

**Application of Proportioning Runway Markings
for Airplane Design Group (ADG) I Runway Width
(Painting)**

Due to the space limitations on very narrow runways, the size and spacing of the numbers and letters are reduced only when necessary such that the painted runway landing designator is no closer than 2 feet (0.6 m) from the runway edge or runway edge markings. For example, this problem may occur when painting certain dual-numbered runway landing designators spaced 15 feet (4.5 m) apart on an ADG I runway width of 60 feet (18.3 m). In such cases, first reduce the 15-foot (4.5-m) spacing to 10 feet (3.1 m) and retain the size of numerals and letter per [Figure A-6](#). Second, reduce the 15-foot (4.5-m) spacing to 10 feet (3.1 m) and reduced the size of numerals and letter proportionally to maintain the 2-foot (0.6-m) edge or runway edge markings clearance.

2.4. Runway centerline marking.

a. Purpose. The runway centerline marking identifies the physical center of the runway width and provides alignment guidance to pilots during takeoff and landing operations. For lighting provisions, see [AC 150/5340-30](#).

b. Requirement. See [Table 2-1](#).

c. Location. A runway centerline marking is located along the physical center of the runway width and spaced between the runway landing designation markings as shown in [Figure A-1](#), [Figure A-2](#), and [Figure A-3](#).

d. Color. The runway centerline marking is white. See paragraph [1.4](#) for required and recommended techniques to enhance this surface marking.

e. Characteristics. A runway centerline marking consists of a line of uniformly spaced stripes and gaps and of uniform width.

(1) The stripes are 120 feet (36.5 m) in length and the gaps are 80 feet (24.3 m) in length.

(2) The minimum width of the stripes is:

- 36 inches (90 cm) for precision runways.
- 18 inches (45 cm) for non-precision runways.
- 12 inches (30 cm) for visual runways.

(3) To accommodate varying runway lengths, all adjustments to the uniform pattern of runway centerline stripes and gaps are made near the runway midpoint (defined as the distance between the two thresholds or displaced thresholds). Under such cases, reduce the lengths of both the stripes and gaps starting from midpoint and proceed toward the runway thresholds. Reduced stripes must be at least 80 feet (24 m) in length, and the reduced gaps must be at least 40 feet (12.3 m) in length. The affected stripes and gaps within the section should show a uniform pattern.

2.5. Runway threshold marking.

a. Purpose. A runway threshold marking, commencing 20 feet (6 m) from the actual start point of runway threshold, closely identifies the actual beginning point of the runway threshold used for landings. For lighting provisions, see AC 150/5340-30.

b. Requirement. See Table 2-1.

c. Location. The runway threshold marking starts 20 feet (6 m) from the actual start point of the runway threshold as shown in Figure A-1 and Figure A-2. This value remains the same even though a 10-foot (3-m) white threshold bar is introduced, such as for displaced thresholds or the addition of a blast pad or stopway, as shown in Figure A-9. Previously, when a displaced threshold was painted or a blast pad or stopway added, the 20-foot (6-m) dimension was increased to 30 feet (9 m) to accommodate the requirement for painting the runway threshold bar. When any runway threshold or displaced threshold is remarked with threshold bar markings, or when a blast pad or stopway is added, the separation is 10 feet (3 m) as shown in Figure A-8.

d. Color. The components of a runway threshold marking are white. See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

e. Characteristics. The runway threshold marking consists of a pattern of longitudinal stripes of uniform dimensions spaced symmetrically about the runway centerline. The number of longitudinal stripes and their spacing is determined by the runway width.

(1) Table 2-2 provides the number of longitudinal stripes for runways having standard runway widths as defined by AC 150/5300-13. Figure A-1 illustrates the pattern for a 150-foot (45-m) wide runway. See paragraph 2.5.e(3) for painting guidance applicable to non-standard runway widths.

Table 2-2. Number of runway threshold stripes for standard runway widths

Standard runway widths	Number of symmetrical stripes
60 feet (18.3 m)	4
75 feet (22.9 m)	6
100 feet (30.5 m)	8
150 feet (45.7 m)	12
200 feet (61 m)	16

(2) For standard runway widths, the longitudinal stripes are 150 feet (45.7 m) long and 5.75 feet (1.75 m) wide with the outer edges spaced (stripe-gap) 5.75 feet (1.75 m) apart. However, the two longitudinal stripes nearest the runway centerline are doubled spaced, i.e., outer edges of the near-most pair are 11.5 feet (3.5 m) apart. Figure A-1 illustrates the stripe-gap pattern for 150-foot (46-m) wide runways. The stripe-gap pattern allows sufficient room to paint runway edge markings without interfering with the outermost longitudinal stripes.

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
(Painting)**

For standard 75-foot (23-m) wide runways that use 36-inch (90-cm) wide runway edge markings, the stripe-gap pattern of 5.75 feet (1.75 m) is reduced to 5.50 feet (1.68 m).

(3) For non-standard runway widths, the same stripe-gap pattern is continued from the runway centerline until the outermost longitudinal stripe is not closer than 4 feet (1.2 m) from the runway edge. For example, for a non-standard 125-foot (38-m) wide runway, the stripe-gap pattern yields a total of 10 longitudinal stripes symmetrical about the runway centerline. In no case should the stripe-gap pattern exceed 92 feet (27 m) on either side of the runway centerline. The value of 92 feet (27 m) is the width for the pattern used on the standard 200-foot (61-m) wide runways.

(4) When there is pavement in excess of 5 feet (1.5 m) prior to the actual start of the runway threshold and (a) pilots may confuse the pavement as part of the actual runway or (b) the pavement does not have the same load bearing capacity as the runway, then painting of a runway threshold bar per paragraph 2.9 is required. In contrast, if the installation of landing threshold lights requires pavement to support the light fixtures and the supportive pavement abuts the start point of the runway threshold, then the supportive pavement is not considered a part of the runway. In this instance, the painting of a runway threshold bar is not required.

2.6. Runway aiming point marking.

a. Purpose. A runway aiming point marking provides a visual aiming point for landing operations.

b. Requirement. See Table 2-1.

c. Location. The preferred beginning of the aiming point marking starts 1,020 feet (311 m) from the runway threshold as shown in [Figure A-1](#), [Figure A-2](#), and [Figure A-3](#). However, this preferred separation is not adequate for all cases as partially discussed below.

Note: The term preferred assumes the following conditions: standard visual glide slope of 3 degrees; no obstacle in the approach area affecting the obstacle clearance surface of the PAPI; standard threshold crossing heights per [AC 150/5340-30](#); sufficient runway length so not to force the placement of the aiming point marking; no rapid terrain drop off near the approach threshold that encounters severe turbulence; no elevation differences between the threshold and the installation zone of the PAPI.

(1) Intersecting Runways. A separation tolerance of plus or minus 200 feet (61 m) is allowed when it is necessary to shift the aiming point marking to avoid overlapping aiming point markings at dual runway intersection as shown in [Figure A-4](#) and [Figure A-5](#), and discussed in paragraph [2.2.c](#). However, depending on the threshold crossing heights and the available runway approach aids, the shifting of the aiming point markings may negatively impact the threshold crossing heights for approaching airplanes. One potential impact of the shift is to the co-located runway approach aids, such as the PAPI, in which the previous vertical guidance offered by the aiming point marking to pilots is now incompatible with the threshold crossing height associated with the runway approach aid. Under such conditions, adjustment in the location of the affected runway approach aid may be necessary after an evaluation so that the co-located relationship between the PAPI (and other approach aids) and the shifted aiming point marking permits an acceptable landing operation for both landing aids.

(2) Compatible Threshold Crossing Heights. See [AC 150/5340-30](#) to determine if the impact of a relocated aiming point marking warrants relocating the co-located PAPI (or other runway approach aids).

d. Color. The runway aiming point marking is white. See paragraph [1.4](#) for required and recommended techniques to enhance this surface marking.

e. Characteristics.

(1) The runway aiming point marking consists of two conspicuous rectangular markings, 150 feet (45.7 m) in length for runways of at least 4,200 feet (1280 m) in length between the thresholds (or a displaced threshold(s)) and 100 feet (30.5 m) in length for lesser lengths between the thresholds (or a displaced threshold(s)), that are located symmetrically on each side of the runway centerline as shown in [Figure A-1](#), [Figure A-2](#), and [Figure A-3](#). See [Table 2-2](#) for the dimensions of standard runway widths per [AC 150/5300-13](#).

(2) The width of each rectangular marking is as follows:

- (i) 30 feet (9.1 m) for standard runway widths of 150 feet (45.7 m) or greater.
- (ii) 20 feet (6 m) for standard runway widths of 100 feet (30.5 m).
- (iii) 15 feet (5 m) for standard runway widths of 75 feet (22.9 m).

(iv) 12 feet (3.7 m) for a standard runway width of 60 feet (18.3 m).

(3) The lateral spacing between the inner sides of the runway aiming point markings is as follows:

(i) For runways of 150 feet (45.7 m) or more in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 72 feet (21.9 m).

(ii) For runways of 100 feet (30.5 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 48 feet (14.6 m).

(iii) For runways of 75 feet (22.9 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 36 feet (11.0 m).

(iv) For runways of 60 feet (18.3 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 28.8 feet (8.8 m).

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
and for Standard Runway Widths less than 150 feet (45.7 m)
(Painting)**

For runways with widths below 150 feet (45.7 m), the width of the rectangular bars and their lateral spacing between the inner sides of the rectangular bars are adjusted in proportion to the available runway width by using the 150-foot (45.7-m) width runway parameters to determine the percentage decrease in lateral spacing and width of each marking. For example, a non-standard 70-foot wide runway would apply $70/150 = 0.467$ to obtain a lateral spacing of $72 \times 0.467 = 33.6$ feet (10.25 m) between the pair and an individual width of $30 \times 0.467 = 14$ feet (4.27 m).

If runway edge markings are also painted, which are not reduced, then the adjustment should add the width of the corresponding runway edge markings plus a minimum 1-foot (0.3-m) clearance between the outer edge of the aiming point marking and the runway edge marking.

Lateral spacing – in no case is the lateral spacing less than 30 feet (9.1 m) except for runways less than 75 feet (22.9 m).

Lengths – in all cases, the length of the aiming point marking remains unchanged.

2.7. Runway touchdown zone marking.

a. Purpose. For landing operations, the touchdown zone marking identifies the touchdown zone along a precision runway in 500-foot (152-m) increments. For lighting provisions, see [AC 150/5340-30](#).

b. Requirement. See Table 2-1.

c. Location. The touchdown zone marking consists of symmetrically arranged pairs of rectangular bars in groups of one, two, and three along the runway centerline as shown in Figure A-1. As shown, there are five groupings with the aiming point marking serving as an independent, sixth pair.

(1) The touchdown zone marking scheme maintains a 900-foot (275-m) “no-marking zone” from the midpoint of the runway back toward the threshold. That is, those pairs of surface markings that extend within 900 feet (275 m) of the runway midpoint are eliminated. The intent of this painting practice is to preserve a 1,800-foot (550-m) unmarked area so pilots do not confuse the surface markings during a landing with the surface markings for the other approach procedure. The same practice applies equally to a displaced threshold, i.e., the midpoint is located between the thresholds or displaced thresholds and not the runway ends. Taking this into consideration, the painted pattern for the runway touchdown zone marking depends on the (a) authorized approach off each runway and (b) the available length between the runway thresholds or displaced threshold, i.e., the midpoint. The surface marking patterns for the two possible cases are provided in Table 2-3 (case #1) and Table 2-4 (case #2).

Case #1 – Only one runway end requires the runway touchdown zone marking scheme. Apply Table 2-3 criteria, which take into account the “no-marking zone” of 900 feet (275 m) from the midpoint back toward the threshold.

Table 2-3. Groupings of touchdown zone markings required when installed from one threshold

Distance Between Thresholds (or displaced thresholds)	Markings for Precision Approach End (includes displaced threshold)	Other Runway End Visual or Non-precision
6,065 ft (1849 m) or greater ¹	Full set of markings	Aiming point marking
5,565 ft (1697 m) to 6,064 ft (1848 m)	Less one grouping of rectangular bar markings ²	Aiming point marking
5,065 ft (1544 m) to 5,564 ft (1696 m)	Less two groupings of rectangular bar markings	Aiming point marking
4,565 ft (1391 m) to 5,064 ft (1543 m)	Less three groupings of rectangular bar markings	Aiming point marking
<p>Note 1: The value of 6,065 feet is derived as follows. For the non-precision or visual runway end, the table assumes the 900-foot “no-marking zone” criterion plus the length of a preferred aiming point marking, which starts 1,020 feet from the start of the threshold to obtain a length of 1,920 feet. Add to this the length of the aiming point marking. Per paragraph 2.6.e(1), the length of the aiming point marking is either 150 feet or 100 feet. This table uses a length of 150 feet because all the entries in column #1 are greater than 4,200 feet. Therefore, adding 150 feet to 1,920 feet obtains a length of 2,070 feet. For the precision end, which equals 3,995 feet, it assumes the 900-foot “no-marking zone” followed by the standard 75-foot-long rectangular bar for a total length of 975 feet. Add to this value the full 3,000-foot touchdown zone marking scheme and the 20-foot separation between the actual starting point of the runway threshold (or displaced threshold) and the bottom edge of threshold marking to obtain 3,995 feet.</p>		

Distance Between Thresholds (or displaced thresholds)	Markings for Precision Approach End (includes displaced threshold)	Other Runway End Visual or Non-precision
<p>Summing the values 3,995 and 2,070 yields 6,065 feet.</p> <p>Note 2: Each reduction in a pair of rectangular bar markings from the precision end equates to a 500-foot (152-m) reduction between the thresholds.</p> <p>The painting rationale for this table is to ignore the midpoint between the thresholds so the precision instrumented landing is favored over non-precision or visual landings. That is, the length of the non-precision/visual side of the runways always remains at 2,070 feet in length to promote the painting of a full set of touchdown zone markings.</p>		

Case #2 – Both runway ends require runway touchdown zone markings. Apply Table 2-4 criteria, which take into account the “no-marking zones” of 1,800 feet (550 m) from the threshold-to-threshold midpoint.

Table 2-4. Groupings of touchdown zone markings required when installed from both thresholds

Distance Between Thresholds (or displaced thresholds)	Markings for Each Threshold (or displaced threshold)
7,990 ft (2436 m) or greater ¹	Full set of markings
6,990 ft (2130 m) to 7,989 ft (2435 m)	Less one grouping of rectangular bars from each side nearest to the runway midpoint ²
5,990 ft (1826 m) to 6,989 ft (2129 m)	Less two groupings of rectangular bars from each side nearest to the runway midpoint ²
4,990 ft (1521 m) to 5,989 ft (1825 m)	Less three groupings of rectangular bars from each side nearest to the runway midpoint ²
<p>Note 1: The value of 7,990 feet is derived as follows. Proceed from the runway midpoint in one direction, and you will have the 900-foot “no-marking zone” criterion followed by the standard 75-foot long rectangular bar for a total length of 975 feet. Add to this value the full 3,000-foot touchdown zone marking scheme plus the 20-foot separation between the actual starting point of the runway threshold (or displaced threshold) and the edge of threshold marking to obtain 3,995 feet. Double this value for both directions to obtain 7,990 feet.</p> <p>Note 2: Each reduction in a grouping of rectangular bar markings from both sides equates to a 1,000-foot (305-m) reduction between the thresholds.</p> <p>The painting rationale for this table is to preserve the midpoint between the thresholds, thereby promoting an equal treatment of painting groupings of rectangular bar markings for both sides.</p>	

(2) Because the location of the aiming point marking may be adjusted from the threshold to accommodate different approach slopes and/or heights over the threshold and to possibly take into account non-zero runway gradients, the location of an adjusted aiming point marking will vary. Please see AC 150/5340-30. Under such conditions, an adjusted aiming point

will, in most cases, continue to be located between the first and the second touchdown zone markings. However, when the accumulative effect of the adjustments is severe (defined as when a touchdown zone marking coincides with or is within 160 feet (48.8 m) of the adjusted aiming point marking), that touchdown zone marking must not be painted. For the pilot community, this practice permits the aiming point marking to retain its prominent visual landing aid as compared to a touchdown zone marking.

d. Color. All rectangular bars are white. See paragraph 1.4 for required and recommended techniques to enhance this marking.

e. Characteristics.

(1) For runway widths of 150 feet (45.7 m) or greater, each rectangular bar is 75 feet (22.9 m) long and 6 feet (1.8 m) wide. The lateral spacing between the inner sides of the rectangular bars on the same side of the runway centerline is 5 feet (1.5 m).

(2) For runway widths less than 150 feet (45.7 m), the length of the marking remains unchanged, but the width and the lateral spacing between the markings are reduced proportionally to the decrease in runway width by using 150-foot (45.7 m) parameters to determine the percentage decrease.

(3) The lateral spacing between the inner sides of the rectangular bars centered along the runway centerline is equal to that of the aiming point marking (criteria repeated below from paragraph 2.6.e(3)). In all cases, the length of the rectangular bars (and the aiming point markings) remains unchanged. See Table 2-2 for the dimensions of standard runway widths.

(i) For runways of 150 feet (45.7 m) or more in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 72 feet (21.6 m).

(ii) For runways of 100 feet (30.5 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 48 feet (14.6 m).

(iii) For runways of 75 feet (22.9 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 36 feet (11.0 m).

(iv) For runways of 60 feet (18.3 m) in width, the lateral spacing between the inner sides of the rectangular bars centered on the runway centerline is 28.8 feet (8.8 m).

**Application of Proportioning Runway Markings
for Non-Standard Runway Widths
(Painting)**

For runways with widths below 150 feet (45.7 m), the width of the rectangular bars and their lateral spacing between the inner sides of the rectangular bars are adjusted in proportion to the available runway width by using the 150-foot (45.7 m) width runway parameters to determine the percentage decrease in lateral spacings and width of the marking. For example, a nonstandard 70-foot wide runway would apply $70/150 = 0.467$ to obtain a lateral spacing for the centered pair of $72 \times 0.467 = 33.6$ feet (10.25 m), a lateral spacing for other pairs of $5 \times 0.467 = 2.3$ feet (0.7 m), and a width of $6 \text{ feet} \times 0.467 = 2.8$ feet (0.85 m). This adjustment must be such that the inner sides of the innermost rectangular bars to the runway centerline align themselves with the inner side of the aiming point marking. Given that the runway edge markings are painted, the adjustment should be such that the clearance between the runway side strip and the outer edge of the three-bar grouping is a minimum of 1-foot (0.3-m). In no case should the three-bar group be painted farther out from the runway centerline than the aiming point marking.

2.8. Runway edge marking.

- a.** Purpose. The runway edge marking provides enhanced visual contrast between the runway edge and the surrounding terrain or runway shoulders and delineates the width of suitable paved area for runway operations. For lighting provisions, see [AC 150/5340-30](#).
- b.** Requirement. See [Table 2-1](#).
- c.** Location. The runway edge marking consists of two parallel stripes, one placed along each edge of the usable runway with the outer edge of each stripe approximately on the edge of the paved useable runway. For extra wide runways, such as military runways converted for public use, the maximum distance between the outer edges of the parallel stripes is 200 feet (61 m). [Figure A-1](#) illustrates the runway edge marking.
- d.** Color. The stripes of the runway edge marking are white. See paragraph [1.4](#) for required and recommended techniques to enhance this marking.
- e.** Characteristics. The runway edge marking has a minimum width of 36 inches (90 cm) for runways of 100 feet (30.5 m) or wider in width and at least 18 inches (45 cm) on smaller width runways (see [Table 2-2](#) for standard runway widths).
 - (1) For runways with a displaced threshold, the edge markings continue through the paved area prior to the displaced threshold as shown [Figure A-8](#). This continuation of the edge markings is required because this paved area is used for takeoffs and landing rollouts from the other direction.
 - (2) Where an aligned taxiway, as shown in [Figure A-8](#) and [Figure A-10](#), precedes a runway threshold, both edge markings will terminate. The point of termination of the edge markings is determined by the taxiway geometry. **Prohibited:** The conversion of a runway

section into an aligned taxiway or the construction of a new aligned taxiway. See [AC 150/5300-13](#). The FAA further recommends that existing aligned taxiways be removed or reconfigured into usable runways, for example, as shown in [Figure A-7](#) and [Figure A-11](#). When a taxiway connects to a runway or the runway has turn pads or turnarounds, the runway edge marking remains continuous between the runway and these adjoining infrastructures.

- (3) For intersecting runways, see guidance in paragraph [2.2](#).

2.9. Runway displaced threshold marking.

The marking scheme for a runway with a displaced threshold, when required by paragraph [2.1](#), includes a runway threshold bar and arrowheads with and without arrow shafts. [Figure A-7](#), [Figure A-10](#), and [Figure A-11](#) illustrate the various applications of displaced thresholds and the requirement for additional marking components. For lighting provisions, see [AC 150/5340-30](#).

a. Runway Threshold Bar Marking.

- (1) Purpose. The runway threshold bar marking delineates the beginning section of the runway available for landing from the unusable section on the approach side of the displaced threshold or prepared surfaces for a blast pad, stopway, EMAS or end of an aligned taxiway.

- (2) Requirement. Install a runway threshold bar marking when there is an unusable section, blast pad, stopway, EMAS, or aligned taxiway on the approach side of the threshold.

- (3) Location. The runway threshold bar marking is an elongated rectangular bar that is located perpendicular to the runway centerline and on the landing portion of the runway. The outboard edge of the marking is aligned with the location labeled “start of runway displaced threshold” as shown in [Figure A-8](#).

- (4) Color. The runway threshold bar marking is white. See paragraph [1.4](#) for required and recommended techniques to enhance this marking.

- (5) Characteristics. The runway threshold bar marking is 10 feet (3.1 m) in width and extends between the runway edges or between the runway edge markings.

b. Arrow Marking. The arrow marking (arrowheads with and without arrow shafts) performs three possible functions, that is, two cases for displaced thresholds and one case for a runway threshold with an aligned taxiway.

- (1) Purposes.

- (i) [Figure A-8](#) illustrates the predominant case in which the threshold is displaced from the runway end. In this case white arrowheads with and without arrow shafts are required to identify the portion of the runway before the displaced threshold to provide centerline guidance for pilots during approaches, takeoffs, and landing rollouts from the opposite direction.

(ii) Figure A-10 illustrates the rare case in which a displaced threshold is preceded by an aligned taxiway. In this case white arrowheads with and without arrow shafts and yellow arrowheads without arrow shafts are required to identify the runway portion from the aligned taxiway portion. Furthermore, a yellow runway demarcation bar is required to identify the start of the runway. See paragraph 2.9.c for runway demarcation bar criteria.

(iii) Figure A-8 illustrates the rare case in which a runway threshold is preceded by an aligned taxiway. In this case yellow arrowheads without arrow shafts are required to identify the runway portion from the aligned taxiway portion.

General Comment
The conversion of a runway section into an aligned taxiway or the construction of a new aligned taxiway is prohibited. See <u>AC 150/5300-13</u> .

(2) Requirement. Install this marking when the threshold is displaced or preceded by an aligned taxiway.

(3) Locations.

(i) For the predominant case, arrow shafts and arrowheads are located on the portion of the runway before the displaced threshold.

(ii) For the rare cases, only arrowheads are used on the portion of the aligned taxiway before the threshold bar marking or the demarcation bar marking.

(4) Colors.

(i) For the predominant case, the arrow shaft and arrowhead are white. See paragraph 1.4 for required and recommended techniques to enhance these markings.

(ii) For the rare cases, the arrowhead is yellow.

(5) Characteristics. The dimensions and spacing requirements for arrow shafts and arrowheads are as shown in Figure A-8 (function one), Figure A-8 (function two), and Figure A-10 (function three).

c. Runway Demarcation Bar Marking.

(1) Purpose. A demarcation bar delineates a runway with a displaced threshold from a blast pad, stopway, or an aligned taxiway that precedes the runway.

(2) Requirement. Install a demarcation bar marking when the threshold is displaced or preceded by a blast pad, stopway, or aligned taxiway.

(3) Location. The demarcation bar is an elongated rectangular bar on a blast pad, stopway, or an aligned taxiway that is perpendicular to the runway centerline at the point of intersection with the start of the runway as shown in Figure A-11. In another application, as

shown in Figure A-10, the portion of aligned taxiway before the demarcation bar is not part of the usable runway.

(4) Color. The demarcation bar marking is yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

(5) Characteristics. The demarcation bar marking is 3 feet (0.9 m) wide and extends across the entire width of the blast pad, stopway, or aligned taxiway.

2.10. Chevron markings for blast pads, stopways, and EMAS.

a. Purposes. The chevron marking identifies paved blast pads, stopways, and EMAS (engineered materials arresting systems) in relation to the end of the runway. For lighting provisions, see AC 150/5340-30, and for EMAS design, see AC 150/5220-22, Engineered Materials Arresting Systems (EMAS) for Aircraft Overruns.

b. Requirement. Install chevron markings on blast pads, stopways, and EMAS.

c. Location. The chevron marking is located on the blast pad and stopway that are aligned with and contiguous to the runway end as shown in Figure A-9 and Figure A-11. The chevron scheme for an EMAS installation is also centered along the extended runway centerline (not shown in Figure A-9 and Figure A-11).

d. Color. Chevron markings are yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

e. Characteristics. Dimensionally, stopways equal the width of the runway while blast pads equal the runway width plus the shoulder widths (see AC 150/5300-13). The dimensions and spacing requirements for chevron markings are shown in Figure A-9. The recommended minimum length for a stopway is 150 feet (45.7 m) to allow for at least two chevron stripes. For cases where (1) standard length blast pads, per AC 150/5300-13, are installed off runway ends designed exclusively for small airplanes (Airplane Design Groups I and II—small) or (2) existing stopways are less than 150 feet (45.7 m) in length on runway widths of 75 feet (22.9 m) or less, the width of the chevrons and the spacing between the chevrons shown in Figure A-9 can be reduced by two-thirds. The intent of the reduction in dimensions is to provide pilots with at least two visible chevrons.

2.11. Runway shoulder marking.

a. Purpose. The runway shoulder marking is used, when needed, as a supplement to further delineate a paved runway shoulder that pilots have mistaken or are likely to mistake as usable runway. This marking is used only in conjunction with the runway edge marking.

b. Requirement. Runway shoulder markings are optional.

c. Location. The runway shoulder marking is located between the runway edge marking and the outer edge of the paved shoulder as shown in Figure A-12.

d. Color. Runway shoulder markings are yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

e. Characteristics. The runway shoulder marking consists of stripes 3 feet (0.9 m) in width and spaced 100 feet (30.5 m) apart along the edge of the runway. The stripes start at the runway midpoint, are slanted at an angle of 45 degrees to the runway centerline, and are oriented as shown in Figure A-12.

Chapter 3. Holding Position Markings.

3.1. Applications of holding position markings.

The purposes for the different holding position markings are to prevent aircraft and vehicles from entering into critical areas associated with a runway and navigational aids or to control traffic at the intersection of taxiways. This advisory circular describes six operational situations (cases) using three different holding position marking schemes. Cases 1, 2, and 3 employ the same marking scheme referred to as Pattern A – runway holding position marking. Cases 4 and 5 employ a different marking scheme referred to as Pattern B – ILS/MLS or POFZ holding position marking. The latter operational situation, Case 5, uses Pattern B in which it usually appears as an L-shaped ladder. Case 6 uses a different marking scheme referred to as Pattern C – intermediate holding position marking for taxiway/taxiway intersections. [Figure A-13](#) and [Figure A-14](#) show the four different marking patterns.

- **Case 1:** In terms of taxiing on a runway, an aircraft will need to hold short of an intersecting runway (see paragraph [3.2](#)).
- **Case 2:** In terms of landing on a runway used for land and hold short operations (LAHSO), the aircraft will need to hold short of an intersecting runway or, in some rare cases, at a specified hold spot on the landing runway (see paragraph [3.2](#)).
- **Case 3** (most common application for Cases 1, 2, and 3): In terms of taxiing on a taxiway, an aircraft will need to hold short prior to entering an active runway (see paragraph [3.3](#)).
- **Case 4:** In terms of taxiing on a taxiway, an aircraft will need to hold short before entering the critical area of an Instrument Landing System (ILS)/Microwave Landing System (MLS) (see paragraph [3.4](#)).
- **Case 5:** In terms of taxiing on a taxiway, an aircraft will need to hold short before entering the critical area of a Precision Obstacle Free Zone (POFZ) (see paragraph [3.5](#)). Although the surface marking pattern is the same as Case 4, the pattern in many applications is L-shaped, instead of only linear in shape.
- **Case 6:** In terms of taxiing on a taxiway, an aircraft will need to hold short of a taxiway/taxiway intersection (see paragraph [3.6](#)).

3.2. Case 1 and Case 2 – Applications of Pattern A for the runway holding position marking on runways.

a. Purpose. Pattern A, when painted on a runway as shown in [Figure A-13](#), identifies the location where a pilot (or vehicle driver) is to stop and hold when (1) the runway is operationally closed for an interval of time so that ATCT can control taxiing operations through a runway/runway intersection or (2) the runway is used for land and hold short operations (LAHSO). For necessary corresponding signage and lighting provisions, see [AC 150/5340-18](#), Standards for Airport Sign Systems, and [AC 150/5340-30](#).

**Safety Initiatives
(Safety)**

Note 1: Land and hold short operations (LAHSO) require a letter of agreement between the airport operator and the airport traffic control tower (ATCT).

Note 2: Since the design standard for a full-length parallel taxiway reduces both wrong-runway takeoffs and runway incursions, we do not recommend the use of an operationally closed runway as a taxiway, especially when a parallel taxiway exists. Such an operation can potentially confuse pilots because this taxiing operation introduces yellow-colored taxiway surface markings onto the runway itself. Hence, to avoid the potential for operational errors by pilots, the airport operator should take measures to meet the full-length parallel taxiway design standard. In some cases, the operational capacity for a given runway could indicate the need for dual parallel taxiways to avoid this type of taxiing operation.

Note 3: To avoid a runway incursion event at runway/runway intersections when an operationally closed runway is used as a taxiway, the intersection must have the runway holding position marking and corresponding signs whether or not pilots taxi through the runway/runway intersection. Additionally, this marking should only be used in those instances where documentation supports the need for the operational use of the runway as a taxiway. The operational use of a runway as a taxiway must be described in a Letter of Agreement with the ATCT.

b. Location. In all Case 1 and Case 2 applications, the criteria given below assume that the centerlines of the intersecting runways are perpendicular. Hence, for runway/runway intersections that are non-perpendicular, additional distance may be required to ensure that all airplane features, such as wingtips, remain outside the protected area of the intersecting runway.

(1) **Operationally Closed Runways Used for Taxiing Operations.** The location of the runway holding position marking on operationally closed runway is in accordance with the holdline criteria per AC 150/5300-13 for the intersecting runway's runway design code.

(2) **Runways Used for LAHSO.**

(i) The location of the runway holding position marking on the runway used for LAHSO is in accordance with the holdline criteria per AC 150/5300-13 for the intersecting runway's runway design code. On rare cases the location of the runway holding position marking for LAHSO is based on a predetermined hold-short point along the landing runway to protect an approach/departure flight path or to overcome painting difficulties as described below in paragraph 3.2.b(2)(ii). In no case should the location of the predetermined hold-short point be within the holdline criteria per AC 150/5300-13 for the intersecting runway's runway design code.

(ii) Certain airfield geometries for runways that are used for taxiing or LAHSO operations have intersecting taxiway(s) that hamper the painting of the runway holding position marking (and installation of accompanying necessary signage) in accordance with the applicable holdline criterion. One such geometry occurs when a crossing taxiway or its fillet

intersects the runway where the marking or sign is to be placed. One solution is to move the hold-short point farther away from the runway/runway intersection so that both the marking and the installed signage clear the common crossing area. Under this solution (1) the marking is always painted at a greater distance than the holdline criteria in AC 150/5300-13, and (2) the required corresponding signage retains only the runway designations, i.e., never uses a taxiway designation.

c. Color. The Pattern A marking scheme, as shown in Figure A-13, is yellow and, when painted on light-colored pavements, is outlined in black. See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this surface marking on light-colored pavements.

d. Characteristics.

(1) The marking is identical to the runway holding position marking installed on a taxiway as described in paragraph 3.3 and shown in Figure A-13. The solid lines, as compared to the dashed lines, are always on the side where the aircraft is to hold.

(2) The marking is installed perpendicular to the runway centerline and interrupts all runway markings except for the runway designation marking. If the runway holding position marking should interrupt the mentioned exceptions, then paint the runway holding position marking farther away than specified by AC 150/5300-13 to avoid any interruption of these specified markings. The painting practice is to avoid “over striping” existing runway surface markings.

(3) The runway holding position marking extends across the full width of the runway but not onto the runway shoulders or onto any intersecting taxiway fillet.

3.3. Case 3 – Applications of Pattern A for the runway holding position marking on taxiways.

a. Purposes. Pattern A, when painted on a taxiway as shown in Figure A-13, serves several roles. For a taxiway that intersects a runway at an airport with an operating airport traffic control tower (ATCT), the Pattern A marking scheme identifies the location on a taxiway where pilots and vehicle drivers are to stop until they receive a clearance from ATCT to proceed onto the runway. Under this role, Pattern A may be supplemented with the Geographic Position Marking as part of the airport’s Surface Movement Guidance Control System (SMGCS) Plan as described in paragraph 4.11 and as shown in Figure D-8. For a taxiway that intersects a runway at an airport without an operating airport traffic control tower, Pattern A identifies the location where a pilot and vehicle drivers are to stop to ensure that they have adequate separation with other aircraft before proceeding onto the runway. For a taxiway that does not intersect a runway but crosses through a runway approach area or the runway safety area, the Pattern A marking scheme identifies the location on a taxiway where pilots and vehicle drivers are to stop to receive clearance from the airport traffic control tower before proceeding through the protected area. This application serves to stop a taxiing aircraft from penetrating the runway safety area (a runway incursion) or any of several airspace surfaces, for example, those used to define the runway threshold, runway inner approach obstacle free zone, or the runway inner transitional

obstacle free zone. If the marking is located closer than prescribed by AC 150/5300-13, such as when the taxiing aircraft penetrates a Terminal Instrument Procedures (TERPS) surface, then the airport operator can expect higher approach minimums to the impacted runway end. AC 150/5300-13 includes a discussion of these airspace surfaces. Except as specified in paragraph 3.2, the runway holding position marking must not be used for any other situations than the roles described in this paragraph. For signage and lighting provisions, see AC 150/5340-18 and AC 150/5340-30.

b. Location. Pattern A for the runway holding position marking is located as follows:

(1) For a taxiway that intersects a runway, the Pattern A runway holding position markings must be located on all such taxiways in accordance with the holdline criteria per AC 150/5300-13 for the runway's runway design code. This measurement is taken to the edge of the holding position marking farthest from the runway, at the taxiway centerline. Because the location is based on the approach visibility minimums, approach category, and airplane design group, the airport operator should use the lowest approach visibility minima and critical aircraft intended to use the runway. Pattern A is used also on turnarounds and holding bays as shown in AC 150/5300-13, especially for airports with an airport traffic control tower or for any runways used at night and in low-visibility conditions. Locating a runway holding position marking other than what is required by this paragraph must be approved by the FAA.

(2) For a taxiway not intersecting a runway but crossing through a runway safety area or a runway approach surface, the Pattern A runway holding position markings must be located on all such taxiways in accordance with the more protective area obtained by either the holdline criteria per AC 150/5300-13 for the runway's runway design code or the boundary of the approach surface's critical area. Locating a Pattern A runway holding position marking other than what is required by this paragraph must be approved by the FAA Airports Regional Office or Airports District Office.

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The extended runway holding position marking, as illustrated in Figure D-4, is mandatory and is the only acceptable means of compliance for 14 CFR Part 139 certificated airports serving ADGs V and VI airplanes. The enhanced runway holding position marking applies only to those taxiway entrances for a given runway that serve these airplane design groups. This surface painted marking is part of the taxiway centerline marking standard under 14 CFR Section 139.311(a)(2).

c. Color. The Pattern A marking scheme, as shown in Figure A-13, is yellow and, when painted on light-colored pavements, outlined in black. See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this surface marking.

d. Characteristics.

(1) Pattern A for the runway holding position marking consists of a set of two continuous lines, two dashed lines, and three spaces that are all parallel, extend across the entire width of the taxiway, measure 12 inches (30 cm) in width, and are separated as shown in [Figure A-13](#). It is located laterally such that a dash is centered on the taxiway centerline. Where the marking extends unbroken over more than one taxiway centerline, locate the marking such that a dash is centered on one taxiway centerline. At airports that do not have an operating ATCT and are not certificated under 14 CFR Part 139, the width and separation measurement may be reduced from 12 inches (30 cm) to 6 inches (15 cm). For clarification, all airports certificated under 14 CFR Part 139, whether or not there is an operating ATCT, are required to use the 12-inch measurement.

(2) The taxiway centerline marking is interrupted by the runway holding position marking as shown in [Figure A-13](#).

(3) For taxiways having taxiway edge markings, interrupt the taxiway edge marking as shown in [Figure A-23](#) so that the Pattern A marking continues to the edge of the defined taxiway width. For taxiways that connect to runways that serve Airplane Design Groups (ADG) V or VI airplanes as defined by [AC 150/5300-13](#), the marking is further extended onto both paved shoulders as shown in [Figure D-4](#). For both airplane design groups, the length of the marking from the taxiway centerline onto the paved shoulder measures 62.5 feet (19 m). The 62.5-foot (19-m) measurement takes into account the downward viewing angle from the cockpit while the pilots are seated in the normal position as well as other safety factors, such as aircraft wander from the taxiway centerline. For taxiways with widths greater than 75 feet (22.9 m), the runway holding position marking is extended 25 feet (7.5 m) [$62.5 \text{ viewing angle minus } (1/2)(75) \text{ standard taxiway width equals } 25 \text{ feet}$] onto the paved taxiway shoulders. Only those taxiway entrances to runways that serve ADGs V or VI are to be further enhanced. Typical airplane models within ADGs V and VI include the Airbus 330-200/-300, A-340-200/-300/-500/-600, A-380, Boeing-747-100/-200/-400, B-777-200/-300, and B-787-8/-9.

(i) If the runway holding position marking is outlined in black, then the taxiway edge markings abut the black outline on both sides of this marking. That is, it abuts the black border of the solid yellow line on one side and abuts the black border of the dashed yellow line on the other side (see [Figure A-13](#)).

(ii) If the runway holding position marking is not outlined in black, then the taxiway edge markings abut the holding position marking on both sides. That is, the taxiway edge markings abut the solid yellow line on one side and abut the dashed yellow line on the other side.

(4) The orientation of Pattern A is for the solid continuous lines to be painted on the side where the aircraft and vehicles will hold before proceeding to the runway. That is, dashed lines are painted closer to the runway.

(5) Pattern A is painted perpendicular to the taxiway centerline but may be canted from the perpendicular in unusual situations, such as an extremely acute, angled taxiway. For such unusual situations, it may be necessary to install additional runway holding position

signs, runway guard lights, or stop bars to emphasize the location of the surface painted runway holding position marking.

(6) Pattern A on converging taxiways, as shown in Figure D-13, meet at an angle when two or more taxiways intersect the same runway hold line. On any angled taxiway to the runway, consideration must be given to locate the painted marking so no portion of an aircraft, e.g., wing tip or tail, penetrates the runway safety area or any protected surface. See AC 150/5300-13 for detailed requirements and information about clearance requirements by aircraft on taxi routes.

(7) For taxiways connecting to runways serving ADGs V and VI, having a light fixture or a sign located on the taxiway shoulder that aligns with the extended runway holding position marking, as shown in Figure D-4, the extended runway holding position marking should extend no closer than 5 feet (1.5 m) to the edge of the light fixture or sign.

(8) For taxiways connecting to runways serving ADGs V and VI whose taxiway shoulder markings interfere with or are within 10 feet (3.1 m) from the extended runway holding position marking, as shown in Figure D-4, the taxiway shoulder markings are to be removed (omitted) from that location.

3.4. Case 4 – Applications of Pattern B for the ILS/MLS holding position marking.

a. Purposes. Pattern B for the ILS/MLS holding position marking as shown in Figure A-13 identifies the location on a taxiway or holding bay where a pilot or vehicle driver is to stop when they have received instructions from the airport traffic control tower (ATCT) to hold before entering an ILS/MLS critical area. The intent of the marking is to protect the signal of the ILS/MLS navigational aid by identifying the holding position for CAT I operations and protecting the approved TERPS for CAT II/III operations. For signage and lighting provisions, see AC 150/5340-18 and AC 150/5340-30.

b. Location. Pattern B for the ILS/MLS holding position marking is located on the taxiway or holding bay at the boundary of the ILS/MLS critical area and, as appropriate, at the holding position for CAT I and CAT II/III operations. The entire marking is located inside the boundary of the protected area.

(1) Where the distance between the runway holding position marking (Pattern A) on a taxiway and the holding position marking (Pattern B) for an ILS (or MLS) critical area is 50 feet (15 m) or less, one holding position may be established, provided it will not affect capacity. In this case, the runway holding position (Pattern A) is moved back to the ILS/MLS holding position (Pattern B) and only the runway holding position markings (Pattern A) are installed.

(2) If a taxiway or holding bay penetrates both an ILS/MLS critical area and the Precision Obstacle Free Zone (POFZ) critical area (see Pattern B, Figure A-13), such as when the threshold is displaced, paint only one pattern instead of two patterns only if the single pattern can protect both critical areas. The pattern to be painted is the one whose location offers the most conservative, protective boundary (for example, farthest from the runway).

(3) The FAA will designate the ILS/MLS critical area and POFZ boundaries and, as appropriate, determine the correct holding position location for CAT II/III operations for the airport operator. See AC 150/5300-13 for general information about the ILS/MLS and POFZ critical areas.

c. Color. The Pattern B marking scheme as shown in Figure A-13 is yellow and, when used on light-colored pavements, outlined in black. See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this surface marking.

d. Characteristics.

(1) Pattern B for the ILS/MLS holding position marking consists of a set of two parallel lines that are 2 feet (0.6 m) wide and spaced 4 feet (1.2 m) apart. These parallel lines are connected by perpendicular sets of two lines that are 1 foot (0.3 m) wide and spaced 1 foot (0.3 m) apart and repeat every 10 feet (3 m). The Pattern B marking for ILS/MLS applications must extend across the entire width of the taxiway or holding bay (see Figure A-13). It is located laterally such that a set of perpendicular lines (parallel to the taxiway centerline) are equidistant from the taxiway centerline. Where the marking extends unbroken over more than one taxiway centerline, locate the marking such that one set of perpendicular lines is equidistant from one taxiway centerline. At airports that do not have an ATCT and are not certificated under 14 CFR Part 139, the airport operator may reduce the dimension for the width of the parallel yellow lines and spaces from 2 feet (0.6 m) to 1 foot (0.3 m) and from 4 feet (1.2 m) to 2 feet (0.6 m). For clarification, all airports certificated under 14 CFR Part 139, whether or not there is an operating ATCT, are required to use the larger measurements.

(2) The taxiway centerline marking is interrupted by the ILS/MLS holding position marking as shown in Figure A-13.

(3) For taxiways having taxiway edge markings, interrupt the taxiway edge marking so that the Pattern B marking continues to the edge of the defined taxiway width as shown in Figure A-13. For taxiways that connect to runways that serve Airplane Design Groups (ADG) V or VI airplanes as defined by AC 150/5300-13, the marking is further extended onto both paved shoulders (similar to Pattern A as shown in Figure D-4) only when the Pattern A marking is omitted per paragraph 3.4.b(1). In that case, for both airplane design groups, the length of the marking from the taxiway centerline onto the paved shoulder measures 62.5 feet (19 m). The 62.5-foot (19-m) measurement takes into account the downward viewing angle from the cockpit while the pilots are seated in the normal position as well as other safety factors, such as aircraft wander from the taxiway centerline. For taxiways with widths greater than 75 feet (22.9 m), the ILS/MLS holding position marking is extended 25 feet (7.5 m) [62.5 viewing angle minus (1/2)(75) standard taxiway width equals 25 feet] onto the paved taxiway shoulders. Typical airplane models within ADGs V and VI include the Airbus 330-200/-300, A-340-200/-300/-500/-600, A-380, Boeing-747-100/-200/-400, B-777-200/-300, and B-787-8/-9.

(i) If the ILS/MLS holding position marking is outlined in black, then the taxiway edge markings abut the black outline on both sides of this marking (see Figure A-13).

(ii) If the ILS/MLS holding position marking is not outlined in black, a 6-inch gap is left between the holding position marking and the taxiway edge marking (see [Figure A-13](#)).

(4) Pattern B is painted perpendicular to the taxiway centerline but may be canted from the perpendicular in unusual situations, such as an extremely acute, angled taxiway. For such unusual situations, it may be necessary to install additional runway holding position signs, runway guard lights, or stop bars to emphasize the location of the surface painted runway holding position marking.

(5) Pattern B on converging taxiways meet at an angle when two or more taxiways intersect the same ILS/MLS hold line. On any angled taxiway to the runway, consideration must be given to locate the painted marking so no portion of an aircraft, e.g., wing tip or tail, penetrates the protected surface. See [AC 150/5300-13](#) for detailed requirements and information about clearance requirements by aircraft on taxi routes.

(6) For taxiways connecting to runways serving ADGs V and VI whose taxiway shoulder markings interfere with or are within 10 feet (3.1 m) from the extended ILS/MLS holding position marking (see paragraph [3.4.d\(3\)](#)), the taxiway shoulder markings are to be removed (omitted) from that location.

3.5. Case 5 – Applications of Pattern B for Precision Obstacle Free Zone (POFZ) holding position marking.

a. Purposes. Pattern B for the POFZ holding position marking as shown in [Figure A-13](#) identifies the location on a taxiway or holding bay where a pilot or vehicle driver is to stop when they have received instructions from the airport traffic control tower (ATCT) to hold before entering the POFZ critical area. The marking is used also at non-towered airport where the runway end has an approved vertical guidance of $\frac{3}{4}$ -statute mile approach visibility minimum or less. The intent of the marking is to protect the authorized landing minima (TERPS) for a given runway end. See [AC 150/5300-13](#) for detailed information about the POFZ critical area. For signage and lighting provisions, see [AC 150/5340-18](#) and [AC 150/5340-30](#). Install this marking when a POFZ exists.

b. Location. Pattern B for the POFZ holding position marking is located on the taxiway or holding bay at the boundary of the POFZ critical area as defined by [AC 150/5300-13](#) and, when appropriate, at the holding position for CAT I and CAT II/III operations. [Figure A-17](#) shows the most common application for this marking, which is L-shaped. Because of the variety of taxiway entrance/holding bay geometries, the Pattern B marking must not be painted over a surface painted holding position sign.

(1) Certain airfield geometries may cause a taxiway or holding bay to penetrate both an ILS/MLS critical area and the Precision Obstacle Free Zone (POFZ) critical area, such as when the threshold is displaced. Under such situations, paint only one pattern instead of two patterns only if the single pattern can protect both critical areas. The pattern to be painted is the one whose location offers the most conservative, protective boundary (for example, farthest from the runway). Under this application the ILS/MLS holding position

(Pattern B) marking or POFZ holding position (Pattern B) marking, which now serves a dual function, cannot be replaced with, or used in lieu of, a runway holding position (Pattern A) marking.

(2) The FAA Airports Regional Office or Airports District Office will designate the ILS/MLS critical area and POFZ boundaries and, as appropriate, determine the correct holding position location for CAT II/III operations for the airport operator.

(3) The Pattern B marking for POFZ applications must extend across only those portions of a taxiway or holding bays that run along the boundary of the POFZ as shown in [Figure A-14](#) and [Figure A-17](#).

c. Color. The Pattern B marking scheme is yellow and, when used on light-colored pavements, outlined in black. See paragraph [1.4](#) and [Table 1-1](#) for required and recommended techniques to enhance this surface marking.

d. Characteristics. Pattern B for the POFZ holding position marking consists of a set of two parallel lines that are 2 feet (0.6 m) wide and spaced 4 feet (1.2 m) apart. These parallel lines are connected by perpendicular sets of two lines that are 1 foot (0.3 m) wide and spaced 1 foot (0.3 m) apart and repeated every 10 feet (3 m). It is located laterally such that a set of perpendicular lines (parallel to the taxiway centerline) are equidistant from the taxiway centerline. Where the marking extends unbroken over more than one taxiway centerline, locate the marking such that one set of perpendicular lines is equidistant from one taxiway centerline. [Figure A-13](#), provides the discontinuation (separation) of a POFZ holding position marking, which follows the same criteria as the ILS/MLS holding position marking, with an intersecting taxiway centerline or taxiway edge markings. [Figure A-17](#) illustrates the general separation of a Pattern B marking from an entrance taxiway serving a runway. At airports that do not have an ATCT and are not certificated under 14 CFR Part 139, the airport operator may reduce the dimension for the width of the parallel yellow lines and spaces from 2 feet (0.6 m) to 1 foot (0.3 m) and from 4 feet (1.2 m) to 2 feet (0.6 m). For clarification, all airports certificated under 14 CFR Part 139, whether or not there is an operating ATCT, are required to use the larger measurements.

3.6. Case 6 – Applications for Pattern C for the taxiway/taxiway intersection intermediate holding position marking.

a. Purpose. Pattern C for the intermediate holding position marking, as shown in [Figure A-13](#) for taxiway/taxiway intersections, is used to support the operational need by the airport traffic control tower to manage taxiing aircraft through a congested intersection or for other reasons deemed necessary by the FAA. For example, [Figure A-15](#) shows the intersection between a taxiway and a holding pad used for deicing aircraft. Pilots when instructed by the airport traffic control tower to “hold short of (taxiway designation)” must stop so no part of the aircraft extends beyond the boundary of the intermediate holding position marking. For signage and lighting provisions, see [AC 150/5340-18](#) and [AC 150/5340-30](#).

b. Location. For the taxiway being marked, the intermediate holding position marking for taxiway/taxiway intersection is located according to the taxiway centerline to fixed

or movable object criteria in AC 150/5300-13 for the most demanding airplane design group serving the airport (per the definition in AC 150/5300-13).

c. Color. The intermediate holding position marking is yellow and, when used on light-colored pavements, outlined in black. See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this surface marking.

d. Characteristics. The intermediate holding position marking for taxiway/taxiway intersections consist of a single dashed line extending across the width of the taxiway per Figure A-14 and Figure C-7. The single dashed lines are 1 foot (0.3 m) wide, 3 feet (0.9 m) long, and spaced 3 feet (0.9 m) apart. The marking is located laterally such that a dash is centered on the taxiway centerline. Where the marking extends unbroken over more than one taxiway centerline, locate the marking such that a dash is centered on one taxiway centerline. As shown in Figure A-14, all intersecting taxiway centerlines are spaced 6 to 12 inches (15 cm to 30 cm) on either side of this marking. When the taxiway has taxiway edge markings, the taxiway edge markings are interrupted.

Chapter 4. Surface Markings for Taxiways.

4.1. Application.

All taxiways regardless of their width have a centerline marking, and whenever a taxiway intersects a runway, the taxiway should have a surface painted runway holding position marking. For 14 CFR Part 139 certificated airports, all taxiways that intersect a runway must have a surface painted runway holding position sign and an enhanced taxiway centerline marking. Taxiway edge markings are installed wherever there is a need to separate the taxiway from a pavement that is not intended for aircraft use or to delineate the edge of the taxiway that is not otherwise clearly visible. Examples of other taxiway surface markings that should be installed when appropriate and deemed necessary by the FAA (in some cases, with input from the tower manager of the airport traffic control tower (ATCT)) include the Pattern A, B, and C holding position markings discussed in [Chapter 3](#), the intermediate holding position markings for taxiway/taxiway intersections, geographic position marking, and the taxiway shoulder marking.

4.2. Taxiway centerline markings.

a. Purpose. The taxiway centerline marking provides pilots continuous visual guidance to permit taxiing along a designated path. See [AC 150/5300-13](#) for standard fillet design, [AC 150/5340-30](#) for lighting provisions and [AC 150/5340-18](#) for signage provisions.

b. Requirement. All taxiways, regardless of their width, have a surface painted taxiway centerline.

c. Location. On a straight section of a taxiway, the taxiway centerline marking is located along the physical centerline of the paved taxiway. This statement assumes the taxiway was built to standard, i.e., symmetrical with a taxiway centerline. On curved sections of a taxiway, the taxiway centerline marking continues from the centerline marking of the straight portion of the taxiway along a curved centerline defined in [AC 150/5300-13](#).

(1) For taxiways that intersect other taxiways, the adequacy of the fillet design determines the centerline painting scheme as shown in [Figure A-18](#). The standard design is cockpit-over-centerline steering, which reduces the number of airplane main gear excursions from the taxiway.

(i) At taxiway intersections with fillets that do not meet the fillet design standards of [AC 150/5300-13](#) for the Taxiway Design Group (TDG) of the taxiway—that is, judgmental over-steering is performed by pilots—the centerline marking continues straight through the intersection as shown at the top [Figure A-18](#). This practice applies to intersecting taxiways that are or are not of the same TDG.

(ii) Where fillets are designed to the TDG of the taxiway, the taxiway centerline marking follows the taxiway curve as shown on the bottom of [Figure A-18](#) to permit cockpit-over-centerline steering operations. This practice applies to intersecting taxiways that are of the same TDG.

Note: AC 150/5300-13 states that cockpit-over-centerline steering is the standard methodology for painting taxiway centerlines in taxiway intersections. To reduce taxiway excursions on turns, airport operators should (1) construct standard fillets and (2) paint taxiway centerlines according to cockpit-over-centerline design.

(2) For taxiways that intersect runways, different painting requirements or restrictions apply.

(i) For a taxiway that intersects a runway at a runway end, as shown in Figure A-16 and Figure A-17, the taxiway centerline is terminated either at the runway edge or at the outer edge of the runway edge marking. However, the taxiway centerline (lead-on and lead-off) will continue onto the runway under the following conditions:

(a) Where there is a displaced threshold, as shown in Figure A-7 and Figure A-11, the taxiway centerline marking continues onto the displaced area of the runway and extends parallel to the displaced threshold markings (arrow heads and arrow shafts) for a distance of 200 feet (61 m) beyond the point of tangency or terminates at the point of contact with the displaced threshold bar, whichever is less. As shown in Figure A-8, the lead-on and lead-off taxiway centerlines are 3 feet (1 m) from the runway arrow markings as measured near-edge to near-edge. This lead-on or lead-off taxiway centerline line is interrupted for all runway markings with some exceptions (see paragraph 4.2.c(2)(i)(b)).

(b) For low-visibility taxiing operations, when the runway visual range (RVR) is below 1,200 feet (366 m), the taxiway centerline marking continues across all runway markings with the exception of the runway designation marking and, unless required by a SMGCS Plan, the runway threshold marking (longitudinal stripes). The painted taxiway centerline marking must follow the path of the in-pavement lighting criteria of AC 150/5340-30. That is, if the in-pavement lighting is curved, the painted taxiway centerline is curved. In this situation, the taxiway centerline marking continues onto the runway and extends parallel to the runway centerline marking for a distance of 200 feet (61 m) beyond the point of tangency and is 3 feet (1 m) from the runway centerline as measured near-edge to near-edge. For some airfield geometry, such as an airfield with parallel runways with several parallel taxiways, the painted taxiway centerline at the runway end is painted straight through the runway end and curved onto the runway. See AC 150/5340-30 for the different RVR in-pavement lighting requirements and recommendations associated with various airfield configurations.

(ii) For taxiways that intersect a runway at any other locations than at the runway end, as shown in Figure A-16, the taxiway centerline marking curves onto the runway and extends parallel to the runway centerline marking for a distance of 200 feet (61 m) beyond the point of tangency with the runway centerline or terminates at the point of contact with the displaced threshold bar, whichever is less. As shown in Figure A-16 and Figure A-17, these lead-on and lead-off taxiway centerlines are 3 feet (1 m) from the runway centerline when measured near-edge to near-edge.

(a) For taxiways that cross a runway, which are either perpendicular to or non-perpendicular to the runway centerline, and are normally used as

crossing taxi routes, the taxiway centerline marking may continue across the runway but is interrupted for all runway markings with some exceptions (see paragraph 4.2.c(2)(i)(b)).

(b) For low-visibility taxiing operations, when the RVR is below 1,200 feet (366 m), the taxiway centerline marking continues across all runway markings with the exception of the runway designation marking and, unless required by the SMGCS Plan, the runway threshold marking (longitudinal stripes), aiming point marking, and the touchdown zone markings.

d. Color. The taxiway centerline marking is yellow. See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this marking.

Painting Notice: Over the years, some airport operators have installed other colors to denote various taxiing routes on the movement areas. These surface markings are non-standard. In an attempt to circumvent the yellow color standard, these different colored centerline markings have sometimes been referred to as supplemental markings or some other ambiguous term. Regardless of what they are called, these surface markings are non-standard and require specific approval by the FAA Director of Airport Safety and Standards. Regarding aircraft deicing facilities that are located in a non-movement area, taxiway/taxilane centerlines are painted in accordance with AC 150/5300-14, Design of Aircraft Deicing Facilities.

e. Characteristics.

(1) Width. The taxiway centerline marking width, which is either 6 inches (15 cm) or 12 inches (30 cm), is based on the type of taxiing operation as described below. Uniform width must be maintained for the entire length of the taxiway except under the following conditions.

(i) The taxiway or part of the taxiway is designated as a SMGCS taxi route. Under this designation, the width of the taxiway centerline must be 12 inches (30 cm) wide and, on light-colored pavement, further outlined in black. The taxiway centerline width of any remaining section of the taxiway that is not part of the designated SMGCS taxi route may change abruptly at that point or at the intersection with other taxiway centerline markings, for example, reduced from 12 inches (30 cm) to 6 inches (15 cm).

(ii) A confusing intersection of taxiways is better served by the designation of a preferred taxi route through the confused intersection by painting a wider centerline width. The FAA recommends that airport operators take measures to realign or reconstruct confusing taxiway intersections.

(iii) If deemed necessary by the airport operator to provide pilots a better visual clue of the location of troublesome taxiway exits from the runway, the airport operator may increase 6-inch (15-cm) wide taxiway centerline markings before the aircraft hold side at the runway holding position location to 12-inch (30-cm) wide lead-off taxiway centerline markings on the runway side.

(2) Discontinuity of the Taxiway Centerline Marking Along the Taxiway. The taxiway centerline marking of a taxiway remains continuous except when it intersects (1) a runway holding position marking, (2) an intermediate holding position marking (intersection of taxiways), (3) an ILS/MLS or POFZ holding position marking, or (4) non-movement area boundary marking (paragraph 5.4). Figure A-13 and Figure A-14 illustrate the marking details for most of these conditions.

4.3. Enhanced taxiway centerline marking.

a. Purposes. The enhanced taxiway centerline marking provides supplemental visual cues to alert pilots of an upcoming runway holding position marking (Pattern A) for minimizing the potential for runway incursions. To reinforce situational awareness before entering a runway, this safety enhancement is only used on those taxiways that directly enter a runway. For example, this safety enhancement would not be painted on a runway or used at all Pattern A applications, such as case 1 or case 2 (paragraph 3.2), situations as shown in Figure D-16, or a taxiway that goes through the runway safety area but not onto the runway itself. The same restriction is valid for case 4 Pattern B applications.

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The enhanced taxiway centerline marking, as illustrated in Figure D-1, is mandatory and the only acceptable means of compliance for all 14 CFR Part 139 certificated airports. All taxiways leading ONLY to a runway holding position marking are to have the enhanced taxiway centerline marking.

This surface painted marking is part of the taxiway centerline marking standard under 14 CFR Section 139.311(a)(2).

b. Location. Taxiway centerlines are enhanced for 150 feet (45.7 m) prior to a Pattern A – runway holding position marking, as shown in Figure D-1, except for the situations described in paragraph 4.3.d. The portion of the taxiway centerline between the runway holding position marking and the runway itself is not enhanced. If the location of taxiway centerline lights and their housings interfere with the painting of the enhanced taxiway centerline, then lights and their housing can be covered up temporarily during the painting process, i.e., lights need not be relocated or housing painted to accommodate this requirement.

c. Color. The enhanced taxiway centerline marking is yellow and must use glass beads. See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this marking. The black border on the outside of the dashes is 3 to 6 inches (7.5 to 15 cm) in width. Never use glass beads on black borders.

d. Characteristics. The standard painted enhanced taxiway centerline marking consists of two parallel lines of yellow dashes one on each side of the existing 6-inch (15-cm) or 12-inch (30-cm) taxiway centerline as shown in Figure D-1 and Figure D-6. For both applications, the first dashes start 6 to 12 inches (15 to 30 cm) from the runway holding position

marking. For Figure D-1 applications, the marking runs for a length of 9 feet (2.7 m) with a 6-inch (15-cm) width and are followed with a gap of 3 feet (0.9 m) between the dashes. For Figure D-6 applications, the first and second set of dashes are 6 to 12 inches (15 to 30 cm) from the runway holding position marking and the surface painted holding position sign. For both cases, the standard painted pattern has a total length of 150 feet (45.7 m). For Figure D-1 applications, the standard pattern consists of 12 sets of 9-foot (2.75-m) dashes plus 3-foot (0.9-m) spaces and ends with a 6-foot (1.8-m) dash for a total length of 150 feet (45.7 m). However, because of the varieties of existing taxiway geometries and the placement of a runway holding position marking, the standard painted pattern is not always painted. The painting patterns for the most common taxiway geometries are described in this section below.

(1) Taxiway Serving Two Closely Spaced Runways. Figure D-16 illustrates how to paint enhanced taxiway centerline markings for a taxiway that connects two closely spaced runways. Each enhancement terminates at the runway edge unless the full 150-foot (46-m) length can be painted. Figure D-16 illustrates situations in which one enhancement is fully painted, one enhancement terminates at the outer edge of the runway edge marking, and the other enhancements terminate at the edge of the runway (Figure D-16 uses an unpainted reference line to terminate the enhancements to Runway 1/19).

(2) Taxiway/Taxiway Intersections and Merging Intersections. Figure D-11 (Note 2), Figure D-12 (Note 1), and Figure D-14 illustrate that if the taxiway centerline to be enhanced intersects another taxiway that is located within 150 feet (45.7 m) of a runway holding position marking and leads to a point other than onto the runway (another enhanced taxiway centerline), the enhancement must terminate 5 feet (1.5 m) prior to the point where the other taxiway centerline crosses the taxiway centerline that is being enhanced. In comparison, on a taxiway, as shown in Figure D-11 (Note 1) and Figure D-13, where the enhancement is 150 feet (45.7 m) or less and merges with a straight or curved taxiway centerline, the enhancement terminates at the last set of full dashes prior to the point of tangency with the other taxiway centerline.

(3) Single, Straight-In, Enhanced Taxiway Centerline Marking Intersecting a Runway Holding Position Marking at Angles of 90 Degrees. Figure D-10 and Figure D-12 (Note 3) show the standard painted patterns, i.e., the enhanced taxiway centerline measures 150 feet (45.7 m) in length. In comparison, Figure D-13 shows a painted pattern for Runway 16/34 in which an enhancement terminates at the last set of full dashes prior to the point of tangency with the other taxiway centerline marking.

(4) Straight-In, Enhanced Taxiway Centerline Markings Intersecting a Runway Holding Position Marking at Angles Other than 90 Degrees. Figure D-3 (details A – D) and Figure D-7 show standard painted patterns. When a straight-in enhancement intersects the runway holding position marking at an angle other than 90 degrees, the first dashes of the enhancement on either side of the taxiway centerline will start and stop at different locations. In this case, use the taxiway centerline as a guide to paint the enhancements as shown in details A – D of Figure D-3. This painting pattern will show both dashes starting 6 to 12 inches (15 to 30 cm) from the first solid bar of the runway holding position marking and ending at the same location. The finished pattern will show for the first set of dashes, one dash longer than 9 feet (2.7 m) and the other dash shorter than 9 feet (2.7 m).

(5) **Single Taxiway Centerline Serving Two Runway Holding Position Markings.** If a taxiway centerline intersects two runway holding position markings as shown in [Figure D-12](#) (Note 2) and measures less than 150 feet (45.7 m) in length, then the entire taxiway centerline is enhanced only between the two runway holding position markings. In no case will the lacking length of the enhancement be painted between the runway itself and the runway holding position markings. To paint this enhancement, start with the 9-foot (2.75-m) dashes from each runway holding position marking (see paragraph [4.3.d\(7\)\(ii\)](#) for painting practice). Next, continue painting the pattern from each starting point until both enhancements meet at the midpoint of the curved taxiway centerline. It is okay if the dashes or the spaces at the midpoint are less than the length specified in the standard. The intent here is to maintain the pattern of long dashes and shorter spaces on each side of the centerline.

(6) **Dual Holding Position Markings.** If an ILS/MLS or a POFZ (Pattern B) holding position marking is within 150 feet (45.7 m) of a runway holding position marking (Pattern A), the enhanced taxiway centerline remains within the confines of the two holding position markings, i.e., the enhancement does not proceed beyond the ILS/MLS or the POFZ holding position marking. Under this situation, the enhanced taxiway centerline terminates 3 feet (0.9 m) before the ILS/MLS and the POFZ holding position markings.

(7) **Curved and Multiple Taxiway Centerlines Converging Prior to or Intersecting a Runway Holding Position Marking.** Various geometries exist such as those shown in [Figure D-9](#), [Figure D-10](#), [Figure D-11](#), and [Figure D-12](#). Below are the most common geometries and the recommended painting patterns.

(i) **Intersecting and Convergent Taxiway Centerlines.** As shown in [Figure D-2](#) and [Figure D-3](#) (Detail B), where two taxiway centerlines intersect or converge before or at the runway holding position marking, the outside dashes continue, with the possible exception of the first set of dashes, to maintain the 9-foot (2.75-m) pattern along the point of convergence. Depending on the geometry, the first inside dashes may be less than 9 feet (2.7 m) but must be aligned with the outside dashes, i.e., the inside dashes stop with and possibly start with the outside dashes. As noted in [Figure D-3](#) (Detail B), it is permissible to omit inside dashes that measure less than 5 feet (1.5 m). Detail B also illustrates that the inside dashes can overlap each other.

(ii) **Curved Taxiway Centerlines Intersecting a Runway Holding Position Marking.** As shown in [Figure D-3](#) (Detail D), when a taxiway centerline is curved, the dashes on either side of the taxiway centerline would start and stop at different locations when maintaining the 9-foot (2.75-m) length. Therefore, in order to correct this mismatch, apply the following painting practice, which takes all measurements from the taxiway centerline:

(a) Each dash in the first set of dashes along with the taxiway centerline will start at the same distance, 6 to 12 inches (15 to 30 cm) from the first solid bar of the runway holding position marking.

(b) To locate the end point of the first set of dashes, first measure 9 feet (2.7 m) along the taxiway centerline. Next, draw an imaginary line that is

perpendicular to the tangent of the taxiway centerline and mark the ends of the first dashes on each side of the taxiway centerline.

(c) Measure an additional 3 feet (0.9 m) along the curved taxiway centerline. Next, draw an imaginary line perpendicular to the tangent of the curve and mark the starting point for the second set of dashes. The ending point for this set is found by measuring 9 feet (2.7 m) along the center of the curved taxiway centerline. An imaginary line perpendicular to the tangent at this point will mark the end of the second set of dashes.

(d) Repeat the procedure for the remaining curved portion of the taxiway centerline, remembering that the last set of dashes only measures 6 feet (1.8 m).

4.4. Taxiway edge marking.

Where the term “taxiway edge marking” is used throughout this AC, it is understood to apply equally to taxilanes.

a. Purposes. The taxiway edge marking, a dual continuous or dashed marking, is used along a taxi route to (1) alert pilots where the demarcation line exists between usable pavement for taxi operations and unusable pavement and (2) identify the edge(s) of a taxi route located on sizeable paved areas that can be crossed over by the pilot. Two marking schemes for the taxiway edge marking are available to the airport operator to indicate whether the pilot is allowed to cross the taxiway edge. [Figure A-15](#), [Figure C-3](#), and [Figure C-4](#) illustrate these marking variations. For lighting provisions, see [AC 150/5340-30](#).

(1) **Continuous Taxiway Edge Marking.** The continuous taxiway edge marking is used to delineate the taxiway edge from the shoulder or some other contiguous paved surface that is not intended for use by pilots. Continuous taxiway edge markings are never used in any operational situation that permits a pilot to cross this surface marking, for example, a taxilane on a terminal or cargo apron.

(2) **Dashed Taxiway Edge Marking.** The dashed taxiway edge marking is used where there is an operational need to define the edge(s) of a taxi route on or contiguous to a sizeable paved area that permits pilots to cross over this surface marking. A common application for this surface marking is a taxi route along the outer edge of a terminal apron. To achieve safety objectives, dashed taxiway edge markings are never used on entrance taxiways or bypass taxiways that directly enter a runway, such as shown in [Figure 5-1](#) and [Figure A-19](#) (see red safety box below, Runway Incursion Mitigation Requirement). Furthermore, airports having dual or more parallel taxiways at a runway end as shown in [Figure 5-1](#) with “paved islands” must use continuous taxiway edge markings around all paved islands (NO TAXI islands). This safety measure is taken to ensure standard wingtip-to-wingtip clearances. Regardless of the taxi route’s site, the location for painting the dashed taxi edge marking must be per [AC 150/5300-13](#) using standard taxiway widths after obtaining standard taxiway/taxilane object free area widths for locating the taxiway centerline. In other words, these dashed taxiway edge markings (the stripe pattern) are never used to provide wing tip clearances for other moving or parked airplanes found, for example, operating on aprons. For this separation situation the airport operator may

use the non-movement area boundary marking to indicate adequate clearance (taxiway/taxilane object free area).

b. Requirement. Taxiway edge markings are used when deemed necessary by the airport operator or the FAA.

c. Location. The taxiway edge marking is located such that the outer edge of the continuous line or dashed line defines the edge of the usable pavement.

d. Color. Both taxiway edge marking schemes are yellow. If black borders are necessary, the black borders on the outside of the marking can be 6 inches (15 cm) in width and never use glass beads.

e. Characteristics.

(1) The outermost edge of both marking schemes must be painted along the edge of the usable pavement.

(2) The continuous taxiway edge marking consists of dual, continuous lines with each line being at least 6 inches (15 cm) in width and spaced 6 inches (15 cm) apart (edge to edge) as shown in [Figure C-3](#). This continuous marking must be used to designate NO-TAXI islands as shown in [Figure A-19](#). Although it is preferable for the inner portion of NO-TAXI islands to be unpaved, for example, grass covered, the inner area may be painted green or painted with striated yellow markings per paragraph [1.3.d](#). Placement of the striated yellow stripes is perpendicular to and abuts the continuous taxiway edge marking. The length, which may be governed by the shape of the NO-TAXI island, should be 5 feet (1.5 m) for TDG-1A and TDG-1B; 15 feet (4.5 m) for TDG-2; 20 feet (6 m) for TDG-3 and TDG-4; and 25 feet (7.6 m) for TDG-5, TDG-6, and TDG-7. Width and separation between striated yellow stripes follow paragraph [1.3.d](#) criteria. One other option to enhance NO-TAXI islands is to apply artificial turf for the portion of the area between the standard taxiway shoulder widths as prescribed by [AC 150/5300-13](#).

(3) The dashed taxiway edge marking consists of dual, dashed yellow lines that are at least 6 inches (15 cm) in width and spaced 6 inches (15 cm) apart (edge to edge) as shown in [Figure C-4](#) or [Figure C-5](#). The dashed lines are 15 feet (4.5 m) in length with 25-foot (7.5-m) gaps as shown in [Figure A-15](#). This marking is never used to designate NO-TAXI islands.

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Recorded runway incursion data associated with multi-taxi entrance designs to a runway that do not use “NO-TAXI islands” between the adjacent taxiway entrances have experienced a higher rate of runway incursions as compared to entrances with NO-TAXI islands. To reduce the possibility of runway incursions, all designs for a direct entrance to a runway that use two or more taxiway entrances must use “NO-TAXI islands” that are outlined with the continuous taxiway edge marking. AC 150/5300-13 prescribes and illustrates only bypass taxiway entrance designs that have NO-TAXI islands as part of the design.

(4) For the case where the taxiway edge marking intersects a holding position marking (Pattern A), then when holding position marking:

(i) is outlined in black, the taxiway edge markings should abut the black outlines on both sides of the runway holding position marking, i.e., the borders for the yellow dashed and yellow solid line.

(ii) is not outlined in black, the taxiway edge markings should abut the yellow holding position marking on both sides, i.e., the yellow dashed and yellow solid line.

4.5. Surface painted holding position signs.

a. Purposes. This surface painted sign provides supplemental visual cues that alert pilots and vehicle drivers of an upcoming holding position location and the associated runway designator(s) as another method to minimize the potential for a runway incursion and, for certain airport geometries, wrong runway takeoffs. Several applications of this surface painted sign for taxiways are shown in Figure D-5 (non-centered), Figure D-6 (centered) and Figure D-15 (stacked). The surface painted holding position sign is used only on those taxiways (not runways) with a Pattern A holding position marking that enter a runway. Taxiways that do not lead directly onto the runway, such as a taxiway that crosses through an approach area, are not to have this surface painted sign. In regards to Pattern B, certain taxi/runway geometries, for example Figure A-17, under specific landing operations do occur in which this surface painted sign is necessary to protect both the runway entrance environment and the ILS/MLS or the POFZ critical area. Figure A-17 shows the POFZ critical area overlapping the holding bay at the entrance to the runway.

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Runway Incursion Mitigation
(Safety)**

The surface painted holding position sign (SPHPS), as illustrated in [Figure D-5](#) or [Figure D-6](#) for existing taxiway widths, is mandatory and the only means of compliance for all 14 CFR Part 139 certificated airports regardless of the number of runways at the airport. The intent of this requirement is to eliminate the various practices among 14 CFR Part 139 certificated airports in which pilots would (1) see the surface painted holding position sign at all taxiway entrances to a runway, (2) only see the marking on extra wide taxiway entrances over 200 feet (61 m) in width, or (3) see none at all at single runway airports. In turn, this all-inclusive application will reduce human confusion among pilots and drivers that may contribute to runway incursions.

This surface painted sign is mandatory on the left side of the taxiway centerline for TDGs 3-7 and centered over the taxiway centerline for TDG-1A, TDG-1B, and TDG-2 even if a vertical runway holding position sign exists. For TDGs 3-7, the surface painted sign for the right side of the taxiway centerline, which is highly recommended for taxiway entrances serving airplane operations that require two person crews, may be eliminated when a taxiway centerline is closer than 45 feet (13.7 m) from the edge of the taxiway and a mandatory vertical runway holding position sign is in clear view (either left or right of the taxiway centerline).

b. Location. The location (and number) of the SPHPS is determined by the width of the taxiway entrance and the number of taxiway centerlines that intersect the same holding position marking. Although the design of all taxiway entrances to a runway should have been based on a single taxiway design group, i.e., all taxiway entrances have the same standard width, some existing runways have varied taxiway widths serving more than one taxiway design group. In such cases, the taxiway design group for that taxiway entrance will determine the location (and number) of the surface painted marking. For example, a runway with a runway design code of C-III-5000 has one taxiway entrance built to TDG-2 standards and others built to TDG-3 standards. For the TDG-2 entrance, a single, centered surface painted marking as shown in [Figure D-6](#) is painted while the TDG-3 taxiway entrances are painted differently.

(1) The SPHPS must not be painted on a runway, including runways that are temporarily used by ATCT as a taxiway.

(2) In all cases, the SPHPS is never painted onto the taxiway shoulders.

(3) In reference to the holding position marking (Pattern A), the surface painted holding position sign is always painted prior to and runs parallel to the holding position marking at a distance of 2 to 4 feet (0.6 to 1.2 m) as shown in [Figure D-5](#), [Figure D-6](#), and [Figure D-7](#). The location takes into account the direction of taxiing and should allow sufficient clearance for in-pavement runway guard lights and/or stop bars.

(4) When a single taxiway centerline intersects the holding position marking (Pattern A), the surface painted holding position sign is located as follows:

(i) For taxiway widths that are greater than 35 feet (10.5 m) (TDG-3 - TDG-7), one or two surface markings are placed 3 to 10 feet (0.9 to 3.1 m) from the center of the taxiway centerline. With a few exceptions, one surface marking must be painted on the left side of the taxiway centerline. The left side rather than the right side is used because not all aircraft that may use this entrance require two-person crews. The surface painted sign for the right side of the taxiway centerline, which is highly recommended for taxiway entrances serving airplane operations that require two-person crews, may be eliminated when a taxiway centerline is closer than 45 feet (13.7 m) from the edge of the taxiway and a mandatory vertical runway holding position sign is in clear view (from either left or right of the taxiway centerline.) Any airport with a taxiway entrance to a runway with insufficient lead-on length (see safety box under Condition 2 of paragraph 4.5.b(5) for definition) to the runway holding position marking, such as [Figure D-11](#), must have two surface painted holding position signs, one on each side of the taxiway centerline marking. Because of the variety in taxiway geometries, such as shown in [Figure D-9](#), [Figure D-10](#), [Figure D-11](#), [Figure D-12](#), and [Figure D-14](#), the taxiway centerline may or may not be perpendicular to the holding position marking. If the taxiway centerline is perpendicular, then placement of the surface painted holding position sign is in accordance with [Figure D-5](#). If the taxiway centerline is not perpendicular, then placement is in accordance with [Figure D-7](#).

(ii) For taxiways widths of 35 feet (10.5 m) or less (TDG-1A, TDG-1B, and TDG-2), one surface marking is centered directly over the taxiway center. If the taxiway centerline is perpendicular to the holding position marking (Pattern A), then placement of the surface painted holding position sign is as shown in [Figure D-6](#). If the taxiway centerline is not perpendicular, then placement is still centered over the taxiway centerline, but oriented to run parallel to the holding position marking. That is, its placement would appear in like fashion when two such markings are painted as shown in [Figure D-7](#).

(5) When two or more taxiway centerlines intersect or converge within 15 feet (4.5 m) of the holding position marking (Pattern A), there might not be enough space for two or more surface painted holding position signs. [Figure D-3](#), [Figure D-12](#), and [Figure D-16](#) are examples of layouts where it is not possible to paint all the required surface painted holding position signs for each converging taxiway centerline. In these cases, a surface painted holding position sign may be omitted on one side of the taxiway centerline as shown in [Figure D-9](#) and [Figure D-12](#) for TDGs 3-7 standard taxiway widths. In the case of TDG-1A, TDG-1B, and TDG-2 standard taxiway widths, a single surface painted holding position sign must be centered over the two converging taxiways where separate surface markings would have overlapped each other. These and other types of geometries will require individual site assessment by the airport operator to determine the number of surface painted holding position signs that are required by this advisory circular and fit properly into the available space. In terms of proper spacing between two taxiway centerlines, a surface painted holding position sign should be approximately equidistant from both taxiway centerlines at a distance of no less than 3 feet (0.9 m) or more than 10 feet (3.1 m) from either taxiway centerline as measured from the center of the taxiway centerlines to the nearest border of the surface painted holding position sign. For difficult taxiway geometries, the airport operator should consult their FAA Regional Airports Division Office or the Airports District Office (ADO) before painting any markings. For such

requests, the airport operator should provide information about the rate of usage by each taxiway centerline, aircraft types, and the available space for painting.

Wrong-Runway Takeoff Mitigation (Safety)

If an airport has a taxiway entrance that simultaneously serves two or more runways, the surface painted holding position sign must show all runway designators plus directional arrows. The directional arrows must approximate the orientation of the runways.

The surface painted holding position sign is part of the standard signage requirements under 14 CFR Section 139.311(b)(1)(ii).

Runway Incursion Mitigation Extra-Wide Taxiway Entrances (Safety)

Condition 1.

Any airport with a taxiway entrance to a runway having a width greater than 200 feet (61 m) as measured along its runway holding position marking requires the following surface markings. First, a surface painted holding position sign must be painted on the left side of the taxiway centerline (or centered over the taxiway centerline for TDG-1A, TDG-1B, and TDG-2 standard taxiway widths). Second, depending on how excessive the width, a “repetitive pattern” of additional surface painted holding position signs must be painted in accordance with [Table 4-1](#) below. This second requirement is in direct response to documented runway incursions associated with extra-wide taxiway entrances to a runway. Note the spacing requirement is based on the Airplane Design Group component of the Runway Design Code, not the Taxiway Design Group.

The repetitive pattern of [Table 4-1](#) relates the spacing of the additional markings to the viewing angles of pilots and to the painting of future parallel taxiway entrances according to [AC 150/5300-13](#). In other words, when the airport operator decides to paint additional parallel taxiway entrances, the criterion in [Table 4-1](#) would already have in place the required surface painted holding position sign within the proper distance of the newly painted taxiway centerlines (or centered over the taxiway centerline for TDG-1A, TDG-1B, and TDG-2).

When the airport operator paints additional parallel taxiway entrances, then the repetitive pattern is completed by painting a NO-TAXI island as shown in [Figure A-19](#)

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(Safety)**

at each midpoint between parallel taxiway centerlines. See paragraph 4.4.e Safety Box for the marking scheme to paint NO-TAXI islands.

Table 4-1. Placement of repetitive surface painted holding position signs and NO-TAXI islands on taxiway entrances of over 200 feet (61 m) in width

Airplane Design Group (ADG) Category ¹	Distance between adjacent surface painted holding position signs ² as measured from the same outer edge ³ Feet (meters)	Midpoint distance for a NO-TAXI island between parallel taxiway centerlines ⁴ as measured from either taxiway centerline Feet (meters)
ADG I	69 (21)	34.5 (10.5)
ADG II	105 (32)	52.5 (16)
ADG III	152 (46.5)	76 (23.25)
ADG IV	215 (65.5)	107.5 (32.75)
ADG V	267 (81)	133.5 (40.5)
ADG VI	324 (99)	162 (49.5)

Note 1: The terms Airplane Design Group and Taxiway Design Group are defined in AC 150/5300-13.

Note 2: Each entry equals the taxiway centerline to parallel taxiway centerline value based on ADG listed in AC 150/5300-13.

Note 3: The listed value assumes that the existing surface painted holding position sign is used as the starting point to measure and paint additional surface markings either on the left side of the taxiway centerline (Figure D-5) or directly centered over the taxiway centerline (Figure D-6). For taxiways with dual surface markings, such as shown in Figure D-5, the measurement should still be from the left-side surface marking. If there is no left-side surface marking, use the center of the taxiway centerline and add 3 to 10 feet (0.9 to 3.1 m) to the listed value in Table 4-1. This numeric range is the dimension letter B used in Figure D-5.

Note 4: Each entry is half of the taxiway centerline to parallel taxiway centerline value based on ADG listed in AC 150/5300-13.

Condition 2.

Any ADG III–VI runway with a taxiway entrance to a runway with insufficient lead-on length to the runway holding position marking must have two surface painted holding position signs, one on each side of the taxiway centerline marking.

The term “insufficient lead-on-length” is defined as follows:

- (1) For the case of a perpendicular taxiway centerline intersecting the holding position marking, such as shown in Figure D-5, Figure D-12 curve #3, and Figure D-14, the design airplane for that runway is unable to line up its entire

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fuselage perpendicular to the runway holding position marking.

- (2) For the case of a non-perpendicular taxiway centerline intersecting the holding position marking, such as shown in [Figure D-7](#) and [Figure D-9](#), the design airplane for that runway is unable to line up its entire fuselage on a straight section of the entrance taxiway centerline while holding at the runway holding position marking.

Three quick, visual indications of this undesirable design condition are (1) taxiway centerlines, such as shown in [Figure D-9](#), that only curve into the runway holding position marking; (2) holding position markings, such as shown in [Figure D-14](#), that are painted in or near the region where taxiway fillets are constructed; and (3) an enhanced taxiway centerline that measures far less than 150 feet (45.7 m) in length.

[Figure D-9](#), [Figure D-10](#), [Figure D-11](#), and [Figure D-12](#) provide some examples on how to paint left-of-centerline and right-of-centerline surface painted holding position signs.

The surface painted holding position sign is part of the standard signage requirements under 14 CFR Part 139.311(b)(1)(ii).

c. Color. The surface painted holding position sign has a red background with a white inscription and, on light-colored pavements, is outlined in black. Although this marking supplements the mandatory runway holding position sign, the black outline that surrounds the white alphanumeric inscription on the signs is not required for the surface painted holding position sign.

d. Characteristics.

- (1) The standard height of the inscription and its location are as follows:

(i) For taxiway widths that are greater than 35 feet (10.5 m) (TDGs 3-7), the inscription is 12 feet (3.7 m), but may be reduced in accordance with the criteria in [Figure D-5](#).

(ii) For taxiways widths of 35 feet (10.5 m) or less (TDG-1A, TDG-1B, and TDG-2), the inscription is in accordance with the criteria in [Figure D-6](#).

**Solutions for Difficult Placements
Stacked Surface Painted Holding Position Signs
(Painting)**

For taxiway entrances or a taxiway entrance with a complex geometry that requires a lengthy inscription (a single surface marking) for two or more runways and that will not fit properly between the existing taxiway centerline and the taxiway edge, the airport operator should reduce the inscription height. Under this solution, the lowest allowable height for the inscription for TDGs 3-7 standard taxiway widths is 6 feet (1.8 m) and for TDG-1A, TDG-1B, and TDG-2 standard taxiway widths is 3 feet (0.9 m). This painting solution may be necessary for smaller standard taxiway widths whose entrance taxiways support two runway ends. If this solution fails, the single marking may then be broken into two separate markings, one marking per runway, but stacked one above the other as shown in [Figure D-15](#). Under this solution, the airport operator should fit the stacked markings such that (1) the height of the inscription is increased toward the standard height and (2) the separation between the stacked inscriptions is 2 to 4 feet (0.6 to 1.2 m). For taxiways less than or equal to 35' wide, the stacked surface painted holding position signs are located centered on the taxiway in accordance with criteria in [Figure D-6](#). See [Figure D-15](#) for the recommended order of appearance for stacked surface painted holding position signs.

Note: All other unaffected runway holding positions that do not require a reduced inscription height must use the standard inscription height. The intent of this note is to maintain uniformity in visual cues across the United States.

(2) The inscription must be identical to the runway holding position sign by using the same numbers, letters, and arrows. The appearance of the letters, numbers, and arrows must be per [Appendix B](#).

(3) The background is rectangular and extends horizontally and vertically beyond the extremities of the inscription 7.5 inches (19 cm) for TDG-1A, TDG-1B, and TDG-2 standard taxiway widths and 15 inches (38 cm) for TDGs 3-7 standard taxiway widths.

(4) The surface painted holding position sign is at least 2 feet (0.6 m) from the edge of the inside taxiway edge marking or from the edge of the paved taxiway when there are no taxiway edge markings. See [Figure D-4](#).

4.6. Surface painted taxiway direction signs.

a. Purpose. The surface painted taxiway direction sign is used with an arrow to provide directional guidance at an intersection.

b. Requirement. This marking is required where it is not possible to provide a taxiway direction sign in accordance with [AC 150/5340-18](#). Optionally, it may be installed where operational experience has indicated that its presence at a troublesome taxiway intersection can assist flight crews in better ground navigation. For signage provisions, see [AC 150/5340-18](#).

c. Location. The edge of the surface painted taxiway direction sign (excluding the border if used) is 3 feet (0.9 m) from the edge of the taxiway centerline and is located on the side of the taxiway centerline that the aircraft travels as shown in Figure A-19. That is, markings that indicate left turns are located on the left-hand side of the taxiway centerline while markings indicating right turns are located on the right-hand side of the taxiway centerline.

(1) The surface painted taxiway direction sign is not painted on runways, including runways that are operationally used as a taxiway, or painted between the runway holding position marking (Pattern A) and the runway.

(2) For crisscrossing taxiways, such as two taxiways crisscrossing at 90 degrees to each other, a surface painted taxiway direction sign is combined with arrows to indicate the different travelling directions at the intersection. Under this application, the single marking is located on the left side of the taxiway centerline.

(i) When it is not practicable to install a taxiway direction sign along the side of the taxiway, paint a surface painted taxiway direction sign and locate it at the same distance from the intersection per AC 150/5300-13 standards for fixed/moveable objects.

(ii) When a surface painted taxiway direction sign supplements a taxiway direction sign installed along the side of the taxiway, the surface painted direction sign may be located at or within the distances per AC 150/5300-13 standards for fixed/moveable objects, and the point of divergence of the painted taxiway centerlines.

(3) A surface painted taxiway direction sign is not co-located with a surface painted holding position sign.

(4) The surface painted taxiway direction sign is not painted on runways, including runways that are operationally used as a taxiway.

d. Color. The surface painted taxiway direction sign has a yellow background with a black inscription that includes an arrow(s). See paragraph 1.4 and Table 1-1 for required and recommended techniques to enhance this marking. On light-colored pavements, a 6-inch (15-cm) black border completely surrounds its perimeter.

e. Characteristics.

(1) The black inscription is 12 feet (3.7 m) in height. However, the height may be reduced if necessary to the minimum height of 9 feet (2.7 m).

(2) Each black inscription must be accompanied by an arrow oriented to show the approximate direction of a turn.

(3) The black inscription with the arrow(s) must conform in appearance to the letters, numbers, and symbols in Appendix B.

(4) The yellow background is rectangular and extends a minimum of 15 inches (38 cm) horizontally and vertically beyond the extremities of the black inscription, which includes the arrow head(s).

(5) A 6-inch (15-cm) wide vertical black stripe separates two black inscriptions when more than one inscription is included on the same side of the taxiway centerline.

(6) See paragraph [4.7.e\(4\)](#) when collocating a surface painted taxiway direction sign with a surface painted taxiway location sign.

4.7. Surface painted taxiway location signs.

a. Purposes. The surface painted taxiway location sign identifies the taxiway upon which the aircraft is located. This marking is used to supplement other signs located along the taxiway system.

b. Requirement. This marking is required when deemed necessary by the airport operator or FAA. Optionally, it may be installed where operational experience has indicated that its presence can assist flight crews in better ground navigation. For signage provisions, see [AC 150/5340-18](#).

c. Location. The surface painted taxiway location sign is located normally on the right side of the taxiway centerline in the direction of travel as shown in [Figure A-19](#). The edge (excluding the border if used) of the surface painted taxiway location sign should be 3 feet (0.9 m) from the edge of the taxiway centerline.

(1) When adequate pavement width exists, a surface painted taxiway location sign may be located on the left side of the taxiway centerline if it is co-located to the left of a surface painted holding position sign (paragraph [4.5](#)). In this case, the two surface painted signs will mimic the mandatory holding position signs. Under this application, if the co-located surface painted taxiway location sign and the mandatory holding position sign serve two converging taxiways, then the surface painted taxiway location sign should be located to the left of the surface painted holding position sign (in the direction of taxiing).

(2) The surface painted taxiway location sign is not painted on runways, including runways that are operationally used as a taxiway, or painted between the runway holding position marking (Pattern A) and the runway.

d. Color. The surface painted taxiway location sign has a black background with a yellow inscription and a yellow border around its perimeter for all pavement surfaces. See paragraph [1.4](#) and [Table 1-1](#) for required and recommended techniques to enhance this marking.

e. Characteristics.

(1) The yellow inscription is 12 feet (3.7 m) in height. However, the height may be reduced if necessary to the minimum height of 9 feet (2.7 m).

(2) The yellow inscription never contains an arrow and must conform in appearance to the letters, numbers, and symbols in Appendix B.

(3) The background is rectangular and extends a minimum of 15 inches (38 cm), which includes the 6-inch (15-cm) yellow border, horizontally and vertically beyond the extremities of the yellow inscription.

(4) When a surface painted taxiway location sign is collocated with a surface painted taxiway direction sign on any pavement surface, paint the inscriptions for both markings of equal height.

4.8. Surface painted gate destination signs.

a. Purpose. The surface painted gate destination sign is used to assist pilots in locating their assigned terminal gate. The marking is especially useful for low-visibility operations.

b. Requirement. This marking is optional.

c. Location. The surface painted gate destination sign may be installed in non-movement areas or movement areas that are in the proximity of terminal building(s) per the examples in Figure A-20 and Figure A-21. The markings are located adjacent to taxiway centerlines on the same side in which a turn will be made while traveling toward the assigned gate.

d. Color. The surface painted gate destination sign has a solid yellow background with a black inscription. On light-colored pavements, a 6-inch (15-cm) black border may be used.

e. Characteristics.

(1) For surface painted gate destination signs containing only a single row of several gate designations as shown in Figure A-20, the black inscriptions must have a maximum height of 4 feet (1.2 m).

(2) For surface painted gate destination signs containing more than one row of gate designations, shown as an option in Figure A-21, the inscriptions must have a minimum height of 3 feet (0.9 m). There is no maximum height size for a surface painted gate destination sign containing more than one row of inscriptions.

(3) The background of the marking is rectangular and extends a minimum of 15 inches (38 cm) horizontally and vertically beyond the extremities of the inscriptions.

(4) The black inscription must conform in appearance to the letters, numbers, and other symbols in Appendix B.

(5) A range of gates that are sequential should be indicated with a single dash. For example, a series of gates A1 through A4 are indicated as "A1 - A4".

(6) A range of gates that are non-sequential should be separated by commas. For example, the gates B1, B3, and B6 are indicated as “B1, B3, B6”.

4.9. Surface painted apron entrance point signs.

a. Purpose. The surface painted apron entrance point sign is used to assist pilots in locating their position along the edges of a large, continuous apron serving the terminal gates. The marking is especially useful for identifying both the entrances and exits in and along the terminal complex. To facilitate shorter, less confusing verbal communication and movement of ground traffic, the surface painted apron entrance point sign is sometimes referred to as the “ramp spot” at some airports.

b. Requirement. This marking is optional.

c. Location. The surface painted apron entrance point sign may be painted in non-movement areas or movement areas that are in the proximity of an apron leading to the concourses or terminal buildings as shown in [Figure A-22](#). The marking, located 7 feet (2.1 m) from taxiway centerline(s), is on the same side of the centerline to which a turn will be made to travel toward the assigned gate.

d. Color. The surface painted apron entrance point sign has a yellow background with a black inscription. The color of the border depends on the pavement color. Concrete or light-colored pavement should use a black border, while dark pavements should use a white border.

e. Characteristics.

(1) The surface painted apron entrance point sign consists of three 9-foot (2.7-m) diameter circles each located 7 feet (2.1 m) from the associated taxiway/apron centerline. As shown in [Figure A-22](#), two circles are located on either side of the entrance taxiway centerline(s) that continues toward the gate and ends with the third circle.

(2) For taxiways that do not turn but continue forward, only the third circle is painted. For complex taxiways where two converging taxiway centerlines cross the non-movement boundary marking in very close proximity to each other, the airport operator may paint a single marking near the non-movement boundary marking that is between the two converging taxiway centerlines. That is, the single marking is not overlapping the taxiway centerlines. For a single taxiway centerline that diverges into two separate taxiway centerlines just prior to the non-movement boundary marking, paint a single marking on the taxiway centerline prior to its splitting into different taxiway centerlines.

(3) Each circle is comprised of an inner 8-foot (2.7-m) diameter yellow circle with a 6-inch (15-cm) outer ring that is black in color for concrete and light-colored pavements and is white in color for asphalt pavements.

(4) The inscription is either numeric or alpha-numeric. For the situation that consists of three circles, the inscription for gate designation within each of the three circles should match.

(5) The black inscription inside each circle should only be a number, black in color and 4 feet (1.2 m) in height.

(6) The appearance of the inscription numbers must conform to the scale of letters, numbers, and other symbols in Appendix B.

4.10. Taxiway shoulder markings.

a. Purpose. Aprons, holding bays, and taxiways are sometimes provided with paved shoulders or stabilization per AC 150/5300-13 to prevent ground erosion attributed to jet blast or water runoff or to minimize engine damage caused by foreign object debris. Although these shoulders are not intended for use by aircraft, conditions may exist along a taxi route that confuse cause pilots and cause them to use the shoulders. For example, a particular taxiway curve with an extra-wide paved shoulder may confuse pilots as to which side of the painted taxiway edge marking stripe is intended for their use. Where such conditions exist, the airport operator should paint taxiway shoulder markings to indicate the non-usable (deceptive) area to pilots. Figure A-23 illustrates this surface marking.

b. Requirement. This marking is optional.

c. Location. The taxiway shoulder marking is painted using a perpendicular reference line draw from the taxiway centerline. The start and stop points, and separation gaps, for painting the marking are described below.

(1) Referring to Figure A-23 on straight sections, the taxiway shoulder markings will be placed perpendicular at each point of intersection with the defined edge of paved taxiway or the taxiway edge marking with additional markings being uniformly placed between the two start and finish markings. The spacing of the markings, centerline-to-centerline, will not exceed 100 feet (30.5 m) between two adjacent markings as shown in Figure A-23.

(2) Referring to Figure A-23 on curved sections, the taxiway shoulder markings will be uniformly spaced along the curve. The first and last markings are placed perpendicular at the point of curvature and point of tangency of the curve or, in the case of a runway/taxiway intersection, at the point of intersection of the runway and taxiway edges. The spacing of the markings, centerline-to-centerline, will not exceed 50 feet (15 m) between two adjacent markings measured at the largest gap of the radially-spaced markings. Two cases exist for the largest gap of the radially-spaced markings.

(i) Case 1. For a taxiway that intersects a paved area as shown in Figure A-23, both curved shoulders are referred to as “inboard” shoulders. Under this case use a 50-foot (15-m) centerline-to-centerline separation (maximum separation) as measured along the inner edge of the curved shoulder that abuts the paved taxiway. Notice that in case 1 both curved shoulders are categorized as inboard shoulders.

(ii) Case 2. For a taxiway that makes a turn prior to connecting another paved area, as shown in Figure A-10, then one curved shoulder is referred to as an “inboard” shoulder and the other as an “outboard” shoulder. Placement of the taxiway shoulder marking along the inboard shoulder is measured as described above. For the outboard shoulder

use the same maximum 50-foot (15-m) centerline-to-centerline placement of the taxiway shoulder marking but as measured along the outer edge of the curved shoulder that abuts the ground.

d. Color. The taxiway shoulder marking is yellow. For NO-TAXI islands with a paved interior, it is acceptable to paint the paved interior green in color instead of painting yellow taxiway shoulder markings. If this option is used, it is acceptable to paint both the interior area and the shoulder area green.

e. Characteristics. The area is marked with 3-foot (1-m) wide yellow stripes that start with the edge of the paved taxiway or the edge of the taxiway edge marking (paint over the black border if present) and extended to within 5 feet (1.5 m) of the edge of the paved/stabilized shoulder area or 25 feet (7.5 m) in length, whichever length is less.

4.11. Geographic position markings.

a. Purpose. The geographic position marking (GPM), as shown in Figure A-24, is used repeatedly along a designated taxi route to serve as an indicator of a location (a spot) so that pilots can confirm holding points or report their location while taxiing during periods of low-visibility operations. The referred to low-visibility operations are those taxiing operations prior to takeoff or after landing that occur when the runway visual range (RVR) is below 1,200 feet (366 m). Operationally, these sequentially numbered holding points differ from a reporting point. For example, one of the GPM (the spot) may be used only as a reporting point when ATCT is sequencing airplanes along the Surface Movement Guidance and Control System (SMGCS) route—when the first airplane reports to ATCT it is passing spot #3, ATCT would then clear the next airplane up to the next open spot. **Note:** See AC 120-57, Surface Movement Guidance and Control System, and AC 150/5340-18 for signage and lighting provisions.

b. Requirement. This marking is required as noted in the airport's SMGCS plan.

c. Location. The repeated marking is located along a low-visibility taxi route identified by the airport's SMGCS Plan. Each marking is positioned to the left of the taxiway centerline in the direction of taxi.

(1) All geographic position markings used operationally by the airport traffic control tower to designate a specific hold point along the low-visibility taxi route are co-located with the intermediate holding position marking (Pattern C) for taxiway/taxiway intersections as shown in Figure A-24. For a taxi route designated for use in visibilities below 600 RVR, the geographic position marking must be collocated with the intermediate holding position marking as well as a clearance bar consisting of three yellow lights. When the GPM is not used operationally for hold points, i.e., the spot is always used as a reporting point for sequencing operations, the painting of an intermediate holding position marking and the installation of the clearance bar are optional.

(2) The geographic position marking is never located at a runway holding position marking (Pattern A) location that immediately enters the runway used for the departure. However, the GPM may be located at a runway holding position for other runway(s) that the designated low-visibility taxi route happens to cross prior to arriving at the departure runway.

(3) A taxiway/taxiway intermediate holding position marking should be used with the geographic position marking, except for a GPM that is located at a runway holding position for the runway that will not be used for takeoff.

(4) The airport operator, in coordination with the FAA Regional Airports Division Office or the Airports District Office, will determine where the geographic position markings are deemed necessary. Generally, the geographic position markings are sequentially numbered holding points along a designated taxi route. To offer airport operators greater flexibility in developing a labeling scheme benefitting ATCT, the inscription scheme may, if approved by the FAA, take into account the specific taxiway intersections. For example, a geographic position marking that is located near Taxiway B2 may be labeled “2B” while another geographic position marking associated with Taxiway E4 is labeled “4E.”

d. Color. The geographic position marking, as shown in [Figure A-24](#), is a 7-foot (2-m) diameter pink circle with a black inscription surrounded by two 6-inch (15-cm) wide rings, one white and one black. When the geographic position marking is painted on concrete or other light-colored pavements, the white ring is inside the black outer ring. When the geographic position marking is installed on asphalt or other dark-colored pavements, the white ring becomes the outer ring and the black ring becomes the inner ring. See paragraph [1.4](#) and [Table 1-1](#) for required and recommended techniques to enhance this marking.

e. Characteristics. The GPM is designated with a black inscription that may be a single number or a number-plus-letter combination. Since the basic marking reappears along the designated low-visibility SMGCS taxi route, each inscription must correspond to the sequential position identified by the SMGCS Plan. The sequential process for inscriptions is as follows.

(1) The number used for the inscription must correspond to its sequential position along the SMGCS taxi route, i.e., 1, 2, 3, etc.

(2) When a number plus a letter combination is used for the inscription, the letter indicates the taxiway’s letter designation on which the marking is located. For example, the inscription “2B” implies the second marking along Taxiway B. Additionally, the number always precedes the letter for all inscriptions.

(3) If a GPM is located on a taxiway with an alphanumeric designation, only the letter portion of the taxiway designation is used for all the inscriptions. For example, if the fourth location on the SMGCS taxi route is located on Taxiway A7, the inscription for this location would read “4A”.

(4) The inscription inside the GPM is centered within the circle.

(5) The inscription has a height of 4 feet (1.2 m).

(6) The numbers and letters used in the inscription are scaled to those in

[Appendix B](#).

4.12. Ramp control markings.

a. Purpose. The ramp control marking is used to facilitate the local ramp tower or the FAA airport traffic control tower in the movement of aircraft and vehicles to designated areas of ramps, aprons, and other paved areas between non-movement areas and the movement area. In terms of controller workload, the surface marking simplifies verbal communications between controllers, pilots, and vehicle drivers during this transition process.

b. Requirement. This marking is optional.

c. Location. The ramp control marking is predominantly located on terminal aprons and cargo ramps within the non-movement area but may be painted within the movement area.

d. Color. The ramp control marking has a black inscription on a yellow background with a black border when painted on light-colored pavements. See [Table 1-1](#) for general guidelines for determining light-colored pavements. The black inscription, determined by the airport operator, may be numeric, letters, or alphanumeric with or without special characters such as an arrow. Flexibility is acknowledged for the black inscription as a means for the airport operator to address the varied operational applications conducted on diverse apron and ramp layouts. The black inscription is centered within the surface marking with a height of at least 4 feet (1.2 m). The numbers, letters, and other characters used in the inscription are scaled to those in [Appendix B](#).

e. Characteristics. Two recommended shapes for ramp markings are as follows.

Note: Existing ramp marking schemes that differ from the two recommended shapes may remain until repainting is necessary for a major section or to replace the existing marking scheme to one of the recommended shapes.

(1) Circular-shaped. Circular ramp markings—illustrated in [Figure 4-1](#), [Figure 4-2](#), and [Figure 4-3](#)—should have a diameter of at least 9 feet (2.7 m), which excludes the black border. The diameter of the circular marking must be increased so the width and height of the black inscription is at least 1 foot (30 cm) from the edges of the yellow circumference. Place the marking directly over the taxiway centerline or so the outer edge of the circular marking, excluding the black border, is within 7 feet (2.1 m) of the taxiway centerline.

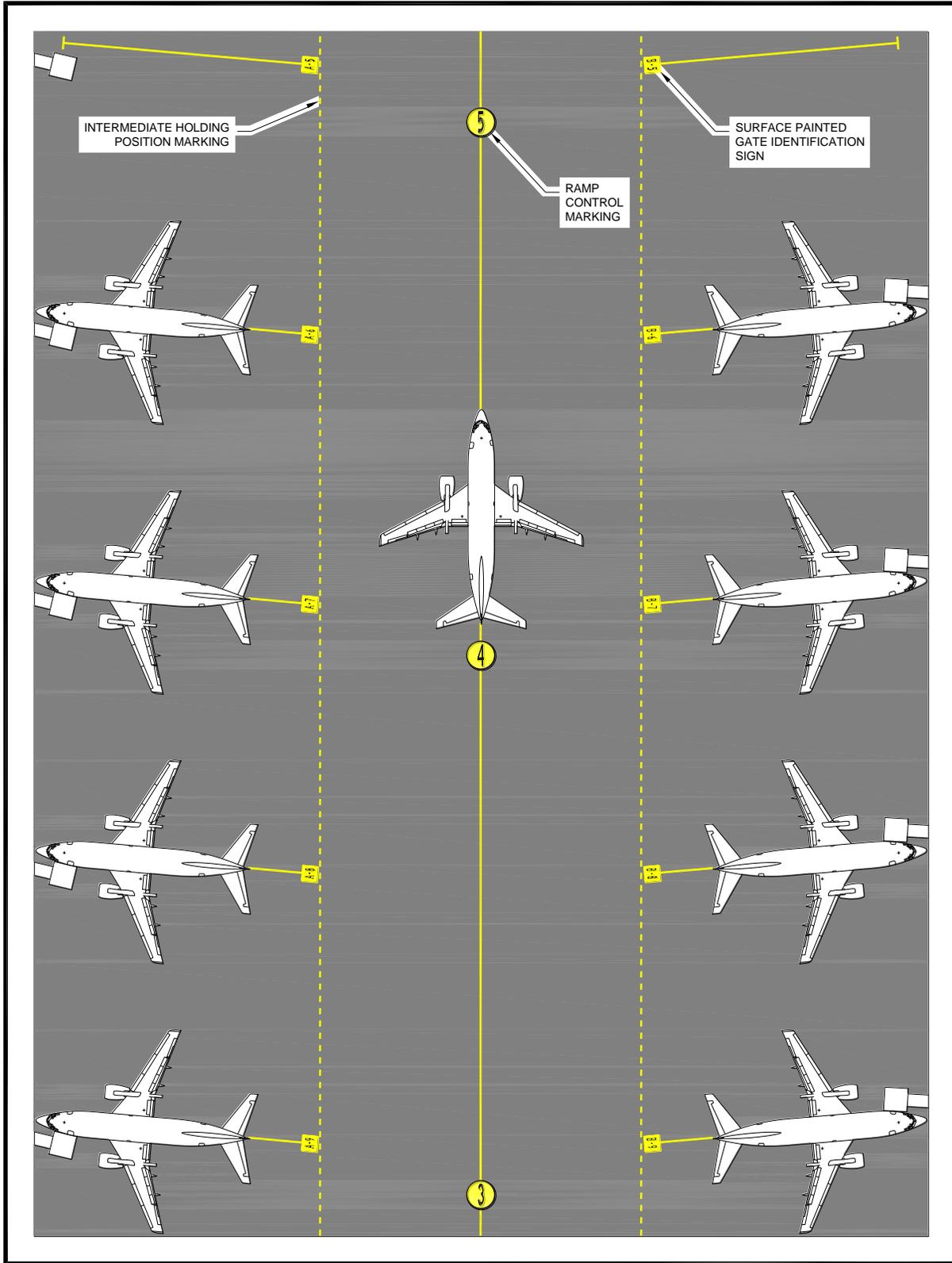


Figure 4-1. Sequential circular-shaped Ramp Control Markings 3, 4, and 5 between two terminals

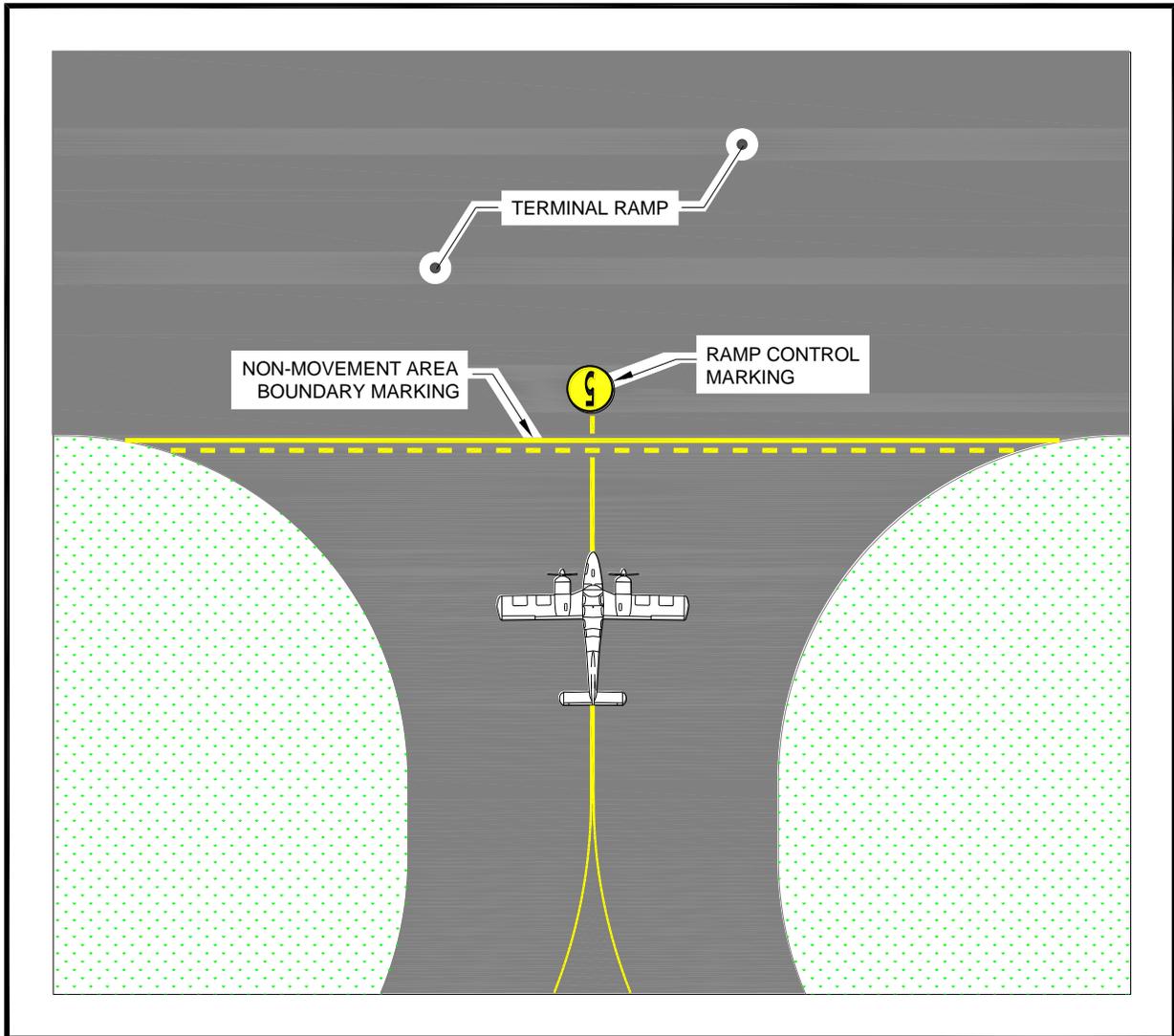


Figure 4-2. Circular-shaped Ramp Control Marking 16 on elongated terminal apron

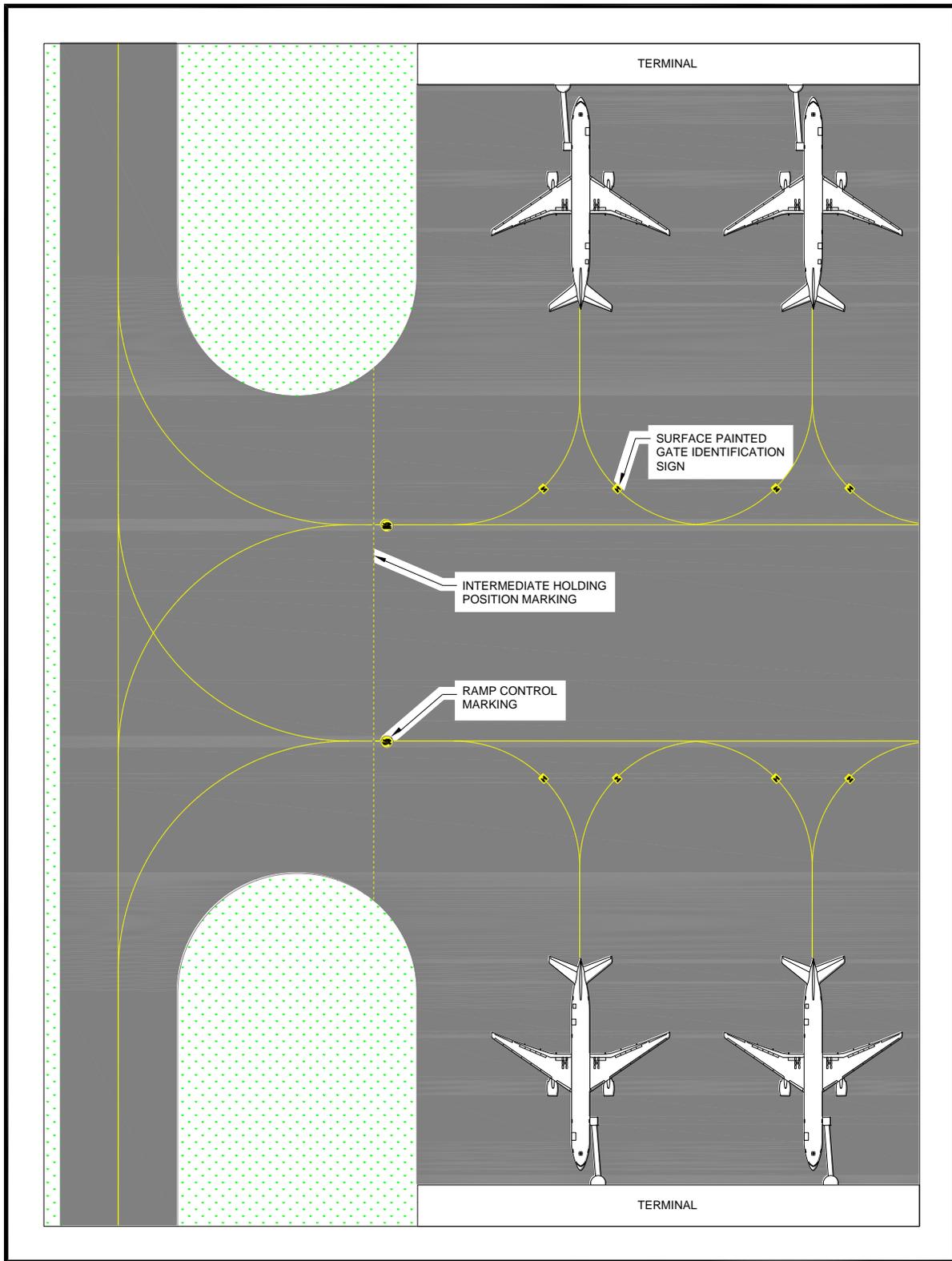


Figure 4-3. Circular-shaped Ramp Control Markings 9S and 9N between terminals

(2) Triangular-shaped. Triangular-shaped ramp markings, as illustrated in Figure 4-4 and defined in Figure 4-5, offer pilots and drivers the additional function of reinforcing a specific direction of travel. Triangular-shaped ramp markings are equiangular triangles of at least 9 feet (3 m) in height. The base and height of the triangular marking must be increased so that the width and height of the black inscription is at least 1 foot (30 cm) from the edges of the yellow triangle. Place the marking directly over the taxiway centerline.

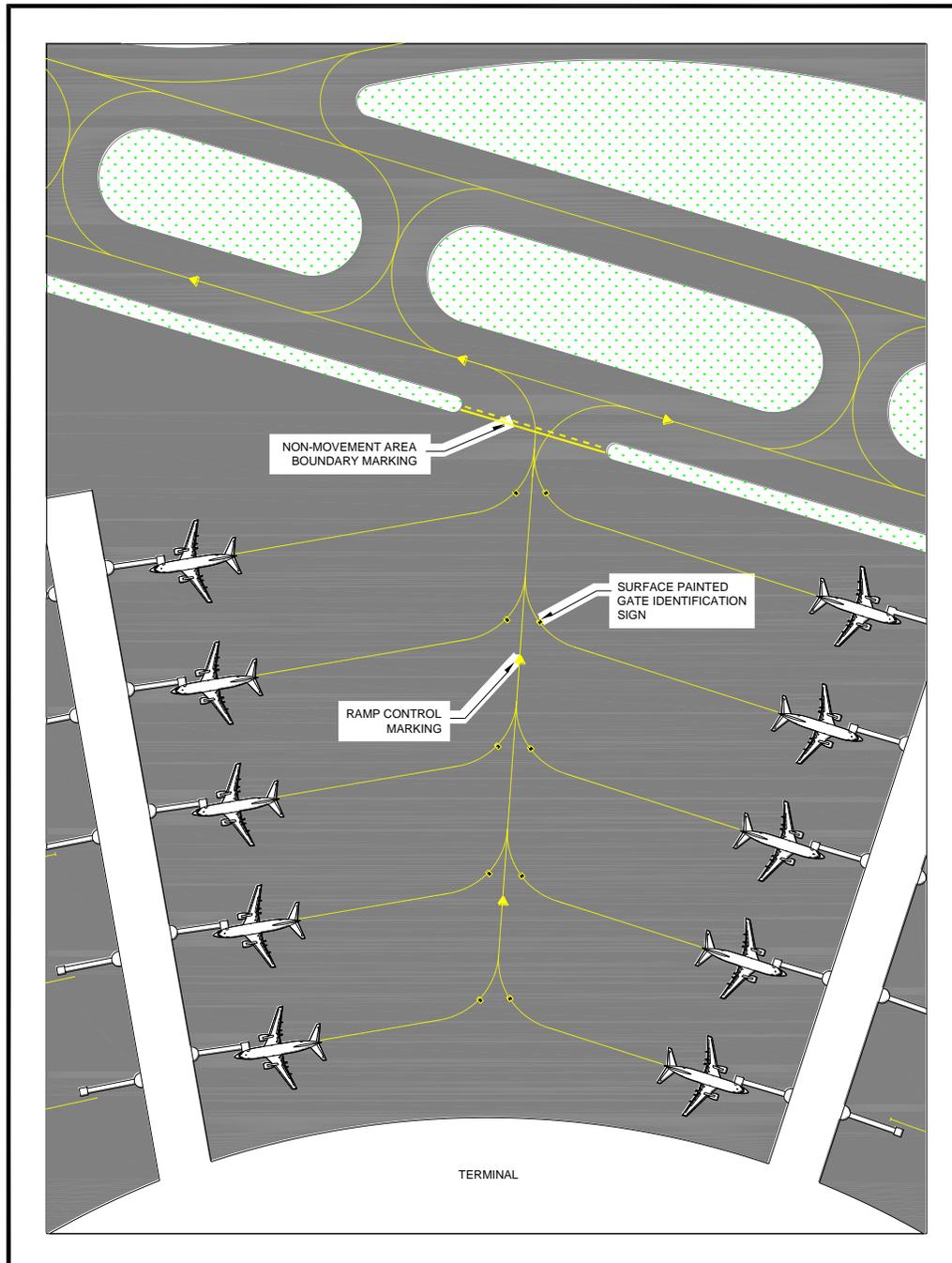


Figure 4-4. Triangular-shaped ramp control marking between terminals

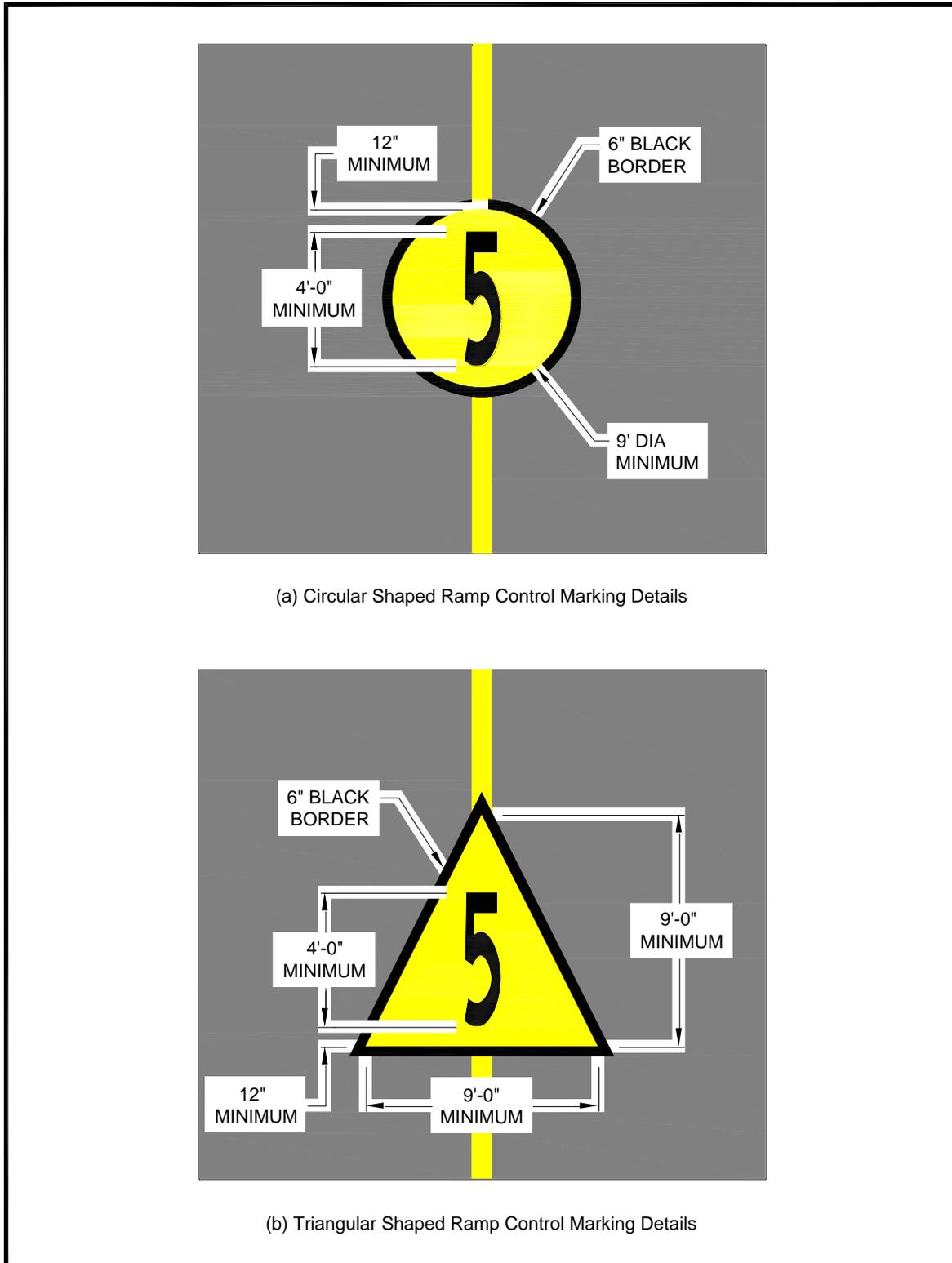


Figure 4-5. Circular and triangular-shaped ramp control marking dimensions

Chapter 5. Other Surface Markings.

5.1. Application.

The surface markings in this section are used, as appropriate, on airports.

5.2. Vehicle roadway markings.

a. Purpose. The three distinct vehicle roadway markings contained in this chapter are used to delineate roadways located on or that cross paved areas used by aircraft (aircraft maneuvering areas) so that collisions and other mishaps are averted. Markings for roadways not located on aircraft maneuvering areas, such as airport service roads, should conform, whenever possible, to the U.S. Department of Transportation's Manual on Uniform Traffic Control Devices. Do not use surface markings intended for aircraft, such as holding position markings or non-movement area boundary markings for roadways used exclusively by vehicles. Such markings may mislead pilots into identifying the roadway as a taxiway. For roadway signage provisions for either case, see [AC 150/5340-18](#).

b. Requirement. These markings are required as necessary to control vehicular traffic.

c. Location. Vehicle roadways are delineated on aircraft maneuvering areas where there is a need to define a pathway for vehicle operations. A minimum separation of 2 feet (0.6 m) must be maintained between the roadway edge marking described below and the non-movement area boundary marking (see paragraph 5.4). All vehicle roadway markings are interrupted when crossing any taxiway and runway markings.

d. Color. Vehicle roadway markings are white.

e. Characteristics.

(1) Vehicle roadway markings consist of (a) roadway edge lines to delineate each edge of the roadway, (b) a dashed line to separate lanes within the edges of the roadway, and, where appropriate, (c) a roadway stop line (bar). The roadway edge lines, which are either solid lines or zipper-style, and the dashed lines are all 6 inches (15 cm) wide, except that zipper-style edges are 12 inches (30 cm) wide and 4 feet (1.2 m) long. See [Figure A-15](#) for details of the zipper-style marking. The dashed line for lane separation is 15 feet (4.5 m) in length and spaced 25 feet (7.5 m) apart. The roadway stop line (bar) is 2 feet (0.6 m) wide and extends across its appropriate lane. See [Figure A-25](#) for illustrations and details.

(2) In lieu of the solid lines for roadway edge lines, zipper-style markings may be used to delineate the edges of the vehicle roadway wherever the airport's SMGCS working group or the airport operator determines the roadway edges need enhanced delineation.

(3) Every roadway lane that feeds vehicle traffic onto or across a taxi route must have a solid roadway stop line (bar). The placement of the stop line (bar) is in accordance with the criteria for taxiway centerline to fixed/movable object per [AC 150/5300-13](#) for the largest airplane design group serving the airport. This placement generally ensures adequate

vehicle clearance from taxiing aircraft. However, the airport operators should evaluate if the effects of jet blasts by turning aircraft operations on vehicle traffic require a larger setback.

5.3. Very High Frequency Omnidirectional Range (VOR) receiver checkpoint marking.

a. Purpose. The VOR receiver checkpoint marking is used by pilots to check their aircraft instruments with navigational aid signals. It consists of a painted circle with a painted directional arrow that is aligned toward the azimuth of the VOR facility. The location of the marking indicates a point on the airport where sufficient signal strength from a VOR facility exists so a pilot can check the aircraft VOR equipment against the radial azimuth indicated by the painted directional arrow. For the accompanying signage provisions, see AC 150/5340-18.

b. Requirement. This marking is required as directed by FAA Flight Inspection Services.

c. Location. FAA Flight Inspection personnel determine the location for the VOR receiver checkpoint marking(s) and issue information for checkpoint descriptions in flight publications. In general, the VOR receiver checkpoint marking preferably is located on an airport apron but could be on a taxiway; it is never on a runway. The location(s) should also allow easy access to align the aircraft with the marking without unduly obstructing other airport traffic. VOR receiver checkpoint markings should not be established at distances less than one-half mile (0.8 km) from the facility, nor on unpaved areas.

d. Color. The VOR receiver checkpoint marking is a painted circle of the size and colors shown in Figure A-26.

e. Characteristics. The VOR receiver checkpoint marking is a painted circle with an arrow that is accompanied with an associated information sign.

(1) The VOR receiver checkpoint is a circle 10 feet (3.1 m) in diameter with a yellow arrow aligned toward the azimuth of the VOR facility.

(2) The arrow should extend to the full width of the inner circle.

(3) The black interior of the circle is surrounded by a 6-inch (15-cm) wide yellow ring contiguous to a 6-inch (15-cm) wide white outer ring per Figure A-26.

(4) When installed on concrete or other light-colored pavements, the interior of the circle is painted black.

5.4. Non-movement area boundary marking.

a. Purpose. The non-movement area boundary marking is used to delineate the movement areas under direct control by the airport traffic control tower from the non-movement areas that are not under their control. Secondary purpose: The primary users of this marking are airport operators with an airport traffic control tower. However, some airport operators without an airport traffic control tower have effectively used this surface marking on terminals and other aprons to separate vehicle traffic, equipment traffic, etc. from the areas where aircraft taxi, such

as, when aircraft enter/exit an aircraft parking area located off the terminal. No part of a parked aircraft may overhang this marking. If aircraft taxi parallel to this marking, paint a taxiway or taxilane centerline marking such that the taxiway/taxilane object free area criteria are met.

b. Requirement. This marking is used when there is a need to delineate the movement areas under direct control by the airport traffic control tower from the non-movement areas that are not under their control, and only where aircraft may cross the marking. Airports without an airport traffic control tower may use the surface marking to help delineate aircraft traffic routes, aircraft parking limits, etc.

c. Location. A non-movement area boundary marking is located on the boundary between the movement and non-movement area as shown in [Figure A-15](#). Prior to its implementation, a letter of agreement should be formalized between the airport operator and airport traffic control tower that specifies the location(s) of the boundaries. To provide adequate clearance for the wings of taxiing aircraft, the marking should never coincide with the edge of a taxiway. In this regard, the non-movement area boundary marking is set back in accordance with the taxiway or taxilane centerline to fixed/movable object criteria (taxiway/taxilane object free area) of [AC 150/5300-13](#). However, the airport operator should evaluate if the effects of jet blasts by turning aircraft operations on equipment, personnel, or vehicle traffic require a larger setback. Taxilane instead of taxiway clearance criteria are usually used because this marking is painted in nearly all cases on terminal aprons, cargo areas, and aircraft parking areas where aircraft taxi at lower speeds.

Mitigation of Wrong Runway Takeoffs (Safety)

Precaution should be taken not to paint a non-movement area boundary marking on the outer edges of an apron that is transitioning into a taxiway that leads directly to a runway. Under certain runway/taxiway geometries, such as shown in [Figure 5-1](#), placement of this surface marking where dual parallel taxiways support a runway have resulted in pilots taking off on a parallel taxiway. The concern of such usage is that pilots who expect a nearby runway holding position marking after leaving an apron will confuse these two markings because of their visual similarities, i.e., single dash/single line versus dual dashes/dual lines. It is recommended that the non-movement boundary marking not be located on or just prior to a taxiway that leads directly to a runway.

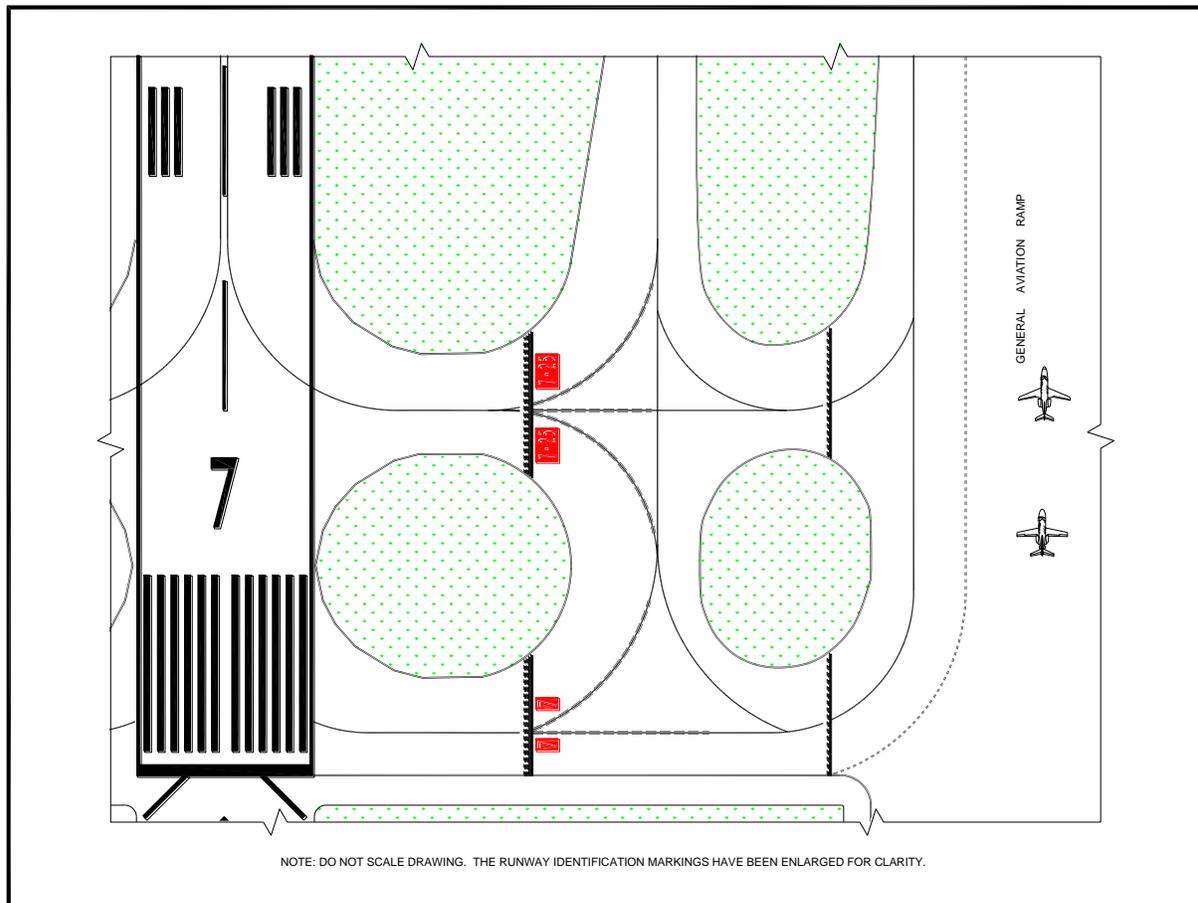


Figure 5-1. Precautionary placement of the non-movement boundary marking

d. Color. The non-movement area boundary marking is yellow and will be outlined in black on light-colored pavements.

e. Characteristics.

(1) The non-movement area boundary marking consists of two yellow lines, one solid and one dashed as shown in [Figure A-15](#). The solid line is located on the side of the non-movement area while the dashed line is located on the side of the movement area.

(2) Each line is 6 inches (15 cm) in width with 6-inch (15-cm) spacing between lines. In the event of circumstances where pilots may have difficulty discerning the edge of a movement area, the width of the lines and spaces may be doubled to 12 inches (30 cm). In both applications, the dashes are 3 feet (0.9 m) in length with 3-foot (0.9-m) spacing between dashes.

(3) If a taxiway centerline intersects a non-movement area boundary marking, then the taxiway centerline is interrupted so that it is 6 to 12 inches (15 to 30 cm) from both sides of the non-movement area boundary marking.

(4) If the non-movement area boundary marking that includes a black border intersects a taxiway edge marking, then the taxiway edge marking is interrupted such that the taxiway edge marking abuts the black border of the non-movement area boundary marking.

(5) If the non-movement area boundary marking that does not include a black border intersects a taxiway edge marking, then the taxiway edge marking is interrupted such that a 6-inch gap is left between the taxiway edge marking and the non-movement area boundary marking.

5.5. Markings for thresholds temporarily relocated during construction.

See AC 150/5370-2, Operational Safety on Airports During Construction, for provisions for marking and lighting a threshold temporarily relocated during construction.

5.6. Marking and lighting of permanently closed runways and taxiways.

Permanently closed paved areas are indicated by the use of an “X”. Figure A-27 provides the detail criteria for the “X” marking.

a. For runways and taxiways that are permanently closed, the lighting circuits are disconnected. For closed runways, all markings for runway thresholds, runway designations, touchdown aiming points, and touchdown zones are obliterated.

b. For closed runways, only solid yellow “X” markings are painted (never striated “X” markings) at each end of the runway and at 1,000-foot (305-m) intervals.

c. For a closed runway that intersects an active runway, a solid yellow “X” marking should be placed on the closed runway near the sides of the open intersecting runway. In most cases, two “X” markings are required, i.e., one “X” per each side of the open intersecting runway.

d. For closed taxiways, a yellow “X” marking is placed at each entrance of the closed taxiway.

e. In terms of pattern selection from Figure A-27, the larger alternate pattern is preferable over the smaller pattern for closed runways because this pattern is seen more readily from aircraft on final approach. For closed taxiways, the smaller pattern is preferable over the larger alternative pattern unless taxiing pilots have difficulty seeing the marking and are entering the closed taxiway or have reported near landings on the closed taxiway.

5.7. Temporarily closed runways and taxiways.

The following procedures are to be followed when it is necessary to temporarily close a runway or a taxiway. See AC 150/5370-2 for requirements and guidelines.

a. For temporarily closed runways, the airport operator has two options when it is necessary to provide a visual indication that a runway is temporarily closed.

(1) Option 1 (preferred). The airport operator uses a raised-lighted “X” on each runway end to indicate the runway is temporarily closed. See AC 150/ 5370-2, Operational Safety on Airports During Construction, for guidance on the use of this visual aid.

(2) Option 2. The airport operator places an “X” only at each end of the runway over the runway designation markings or, when required by construction activity, just off the runway end. The “X” is yellow in color and conforms to the dimensions specified in Figure A-27. Since the “X” is used temporarily, they are usually made of some easily removable material, such as plywood or fabric, rather than painted on the pavement surface. Any materials used for a temporary “X” should provide a solid appearance, for example, not flap in the wind, say by using a ground anchor device. Anchoring devices should be designed to minimize damage to pavement, and any damage should be repaired before the runway is opened to aircraft traffic. Since the “X” will usually be placed over white runway markings, their visibility can be enhanced by a 6-inch (15-cm) black border.

b. For temporarily closed taxiways, the airport operator has two options when it is necessary to provide a visual indication that a taxiway is temporarily closed.

(1) Option 1. Usually this type of closure is treated as a hazardous area so the guidance in paragraph 5.13 applies.

(2) Option 2. As an alternative, the airport operator may install the same yellow “X” shown in Figure A-27 for those entrances leading into the temporarily closed taxiway.

c. If the runway or taxiway will be closed during the nighttime, the runway and taxiway lights will normally be disconnected so they cannot be illuminated unless such illumination is needed to perform maintenance operations on or adjacent to the runway, e.g., snow removal.

General Comment

Note: The airport operator is responsible for determining (1) the need for a visual indication that a runway or taxiway is temporarily closed and (2) the safest place to put the “X” or “X”s or other indicators per paragraph 5.13. In making these determinations, the airport operator should consider such things as the reason for the closure, duration of the closure, airfield configuration, and the existence and hours of operation of the airport traffic control tower and construction crews.

5.8. Converting a runway to a taxiway.

The following actions are necessary to convert a runway permanently to a taxiway. Operationally, once this conversion is invoked, aircraft are not permitted to land or take off from the taxiway.

a. All runway markings found on the runway are obliterated or replaced with the appropriate taxiway markings. For example, the runway landing designation numbers are obliterated, and the white runway centerline is converted to a yellow taxiway centerline.

b. All runway related signage and lighting fixtures found on or along the runway must be removed and/or replaced with the appropriate taxiway signage and lighting to indicate the existence of the converted taxiway. For example, runway edge lights are converted to blue edge lights, and runway centerline lighting fixtures are converted to green. (It may be possible to do both actions by changing the lens color.) See AC 150/5345-46, Specification for Runway and Taxiway Light Fixtures, for information about taxiway edge lights; AC 150/5345-39, Specification for L-853 Runway and Taxiway Retroreflective Markers, for information about Runway and Taxiway Retroreflective Markers; and AC 150/5340-30 for information about taxiway centerline lighting requirements.

c. All markings associated with the converted runway but not painted on the runway, such as the runway holding position markings found on entrance taxiways, are obliterated and replaced with the appropriate taxiway markings. Additionally, runway related signage and lighting fixtures found off the runway must be removed and/or replaced with the appropriate taxiway signage and lighting to indicate the existence of the converted taxiway.

d. In terms of documentation, airport operators must update their Airport Layout Plan as well as other appropriate documents to indicate the presence of the new taxiway and the permanent closure of the runway. Both the Airport/Facility Directory (A/FD) and the Airport Master Record (FAA Form 5010) need to indicate the conversion to a permanent taxiway.

General Comment
Note: The “X” closure marking is never used on this type of conversion since the converted pavement is intended to be an active, new taxiway.

5.9. Intermittent use of a taxiway as a runway.

The intermittent use of a taxiway as a runway is a type of conversion where the converted taxiway is either used only as a runway or used as a runway for a specified time of the day or night. In both of these applications, the airport operator must properly re-mark affected pavements (including provisions for signage and lighting). One required restriction for any conversions is that the converted pavement cannot be marked simultaneously with a yellow taxiway centerline and a white runway designation number. Other re-marking actions are listed below. The FAA recommends a Safety Management System risk assessment to determine if other necessary actions need to be implemented.

General Comment
Note: For airports subject to National Environmental Policy Act (NEPA) requirements, any proposal to use a taxiway as a runway should include a review of the potential environmental consequences of such an action. The airport operator should contact the FAA Airports Regional Office or Airports District Office for NEPA guidance.

a. Pavement used as a runway during the day should at a minimum be painted with the visual runway markings identified in Table 2-1, that is, the white landing designation

number(s) and a white centerline. Furthermore, converted pavement used as a runway at night that is to be lighted should have runway lighting installed per AC 150/5340-30.

b. If the pavement is to be used ONLY as a taxiway at night, blue edge lights should be installed per AC 150/5340-30.

c. In terms of documentation, airport operators must update their Airport Layout Plan as well as other appropriate documents to indicate the presence of the new runway. If the runway is to be used ONLY as a taxiway at night and has blue edge lighting, this runway must be listed as unlighted along with an appropriate annotation in both the Airport/Facility Directory (A/FD) and the Airport Master Record (FAA Form 5010) indicating the runway is closed to nighttime operations and that the blue lights are provided for taxiing aircraft.

d. Since the pavement is now considered a runway, any taxiways intersecting the designated runway must have appropriate runway holding position markings (including provisions for signage and lighting) painted per this AC including criteria from AC 150/5340-18, and AC 150/5340-30.

5.10. Closed or abandoned airports.

When all runways are closed temporarily, the airport beacon is turned off and the runways are marked per paragraph 5.7. When an airport is abandoned and all runways are closed permanently, the runways are marked per paragraph 5.6, the airport beacon is disconnected, and an “X” is placed in the segmented circle or at a central location if no segmented circle exists. For additional details, see AC 150/5370-2.

5.11. Heliport markings.

Information on markings for heliports is in AC 150/5390-2, Heliport Design.

5.12. Marking for arresting gear.

Information on marking for arresting gear is in AC 150/5220-9, Aircraft Arresting Systems on Civil Airports.

5.13. Hazardous construction areas.

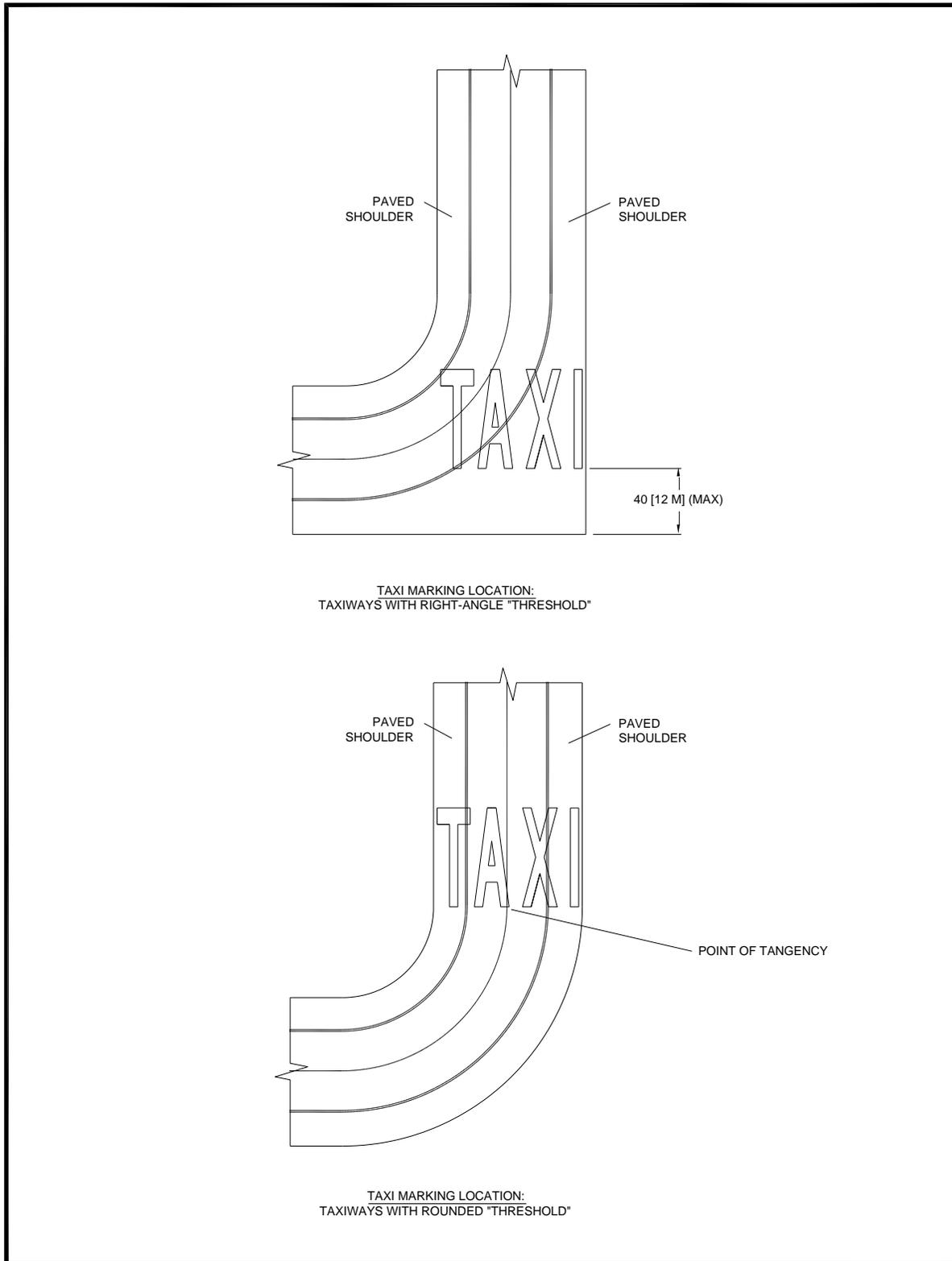
Marking of hazardous areas due to construction, in which no part of an aircraft may enter, are marked in accordance with AC 150/5370-2.

5.14. Aircraft deicing facility markings.

Information on markings for aircraft deicing facilities is in AC 150/5300-14, Design of Aircraft Deicing Facilities.

5.15. Interim surface markings for taxiways mistaken as runways.

This advisory circular recognizes the use of the non-standard surface marking “TAXI” as an interim measure only for those taxiways that have repeated landing incidents. **Note:** For new construction, the outer edge of an entrance taxiway must be curved. See AC 150/5300-13, Figure 5-2 and Figure 5-3 provide location and characteristics for this application. In practice “TAXI” extends across the entire pavement including any paved shoulder as shown in the figures. The color is yellow with a 12 inch (30.5 cm) wide black border along the sides of each letter and a 4-foot (1.2-m) black border on the tops and bottoms of the letters. Figure 5-4 illustrates the combined application with aviation grade artificial turf. See FAA Engineering Brief No. 72A, Positive Identification Of Runways For Landing, which provides guidance for identifying situations where a taxiway could be mistaken for a runway and provides other mitigation strategies for dealing with this problem.



Note: For new construction, the outer edge of an entrance taxiway must be curved. See AC 150/5300-13.

Figure 5-2. TAXI marking location facing runway approach end

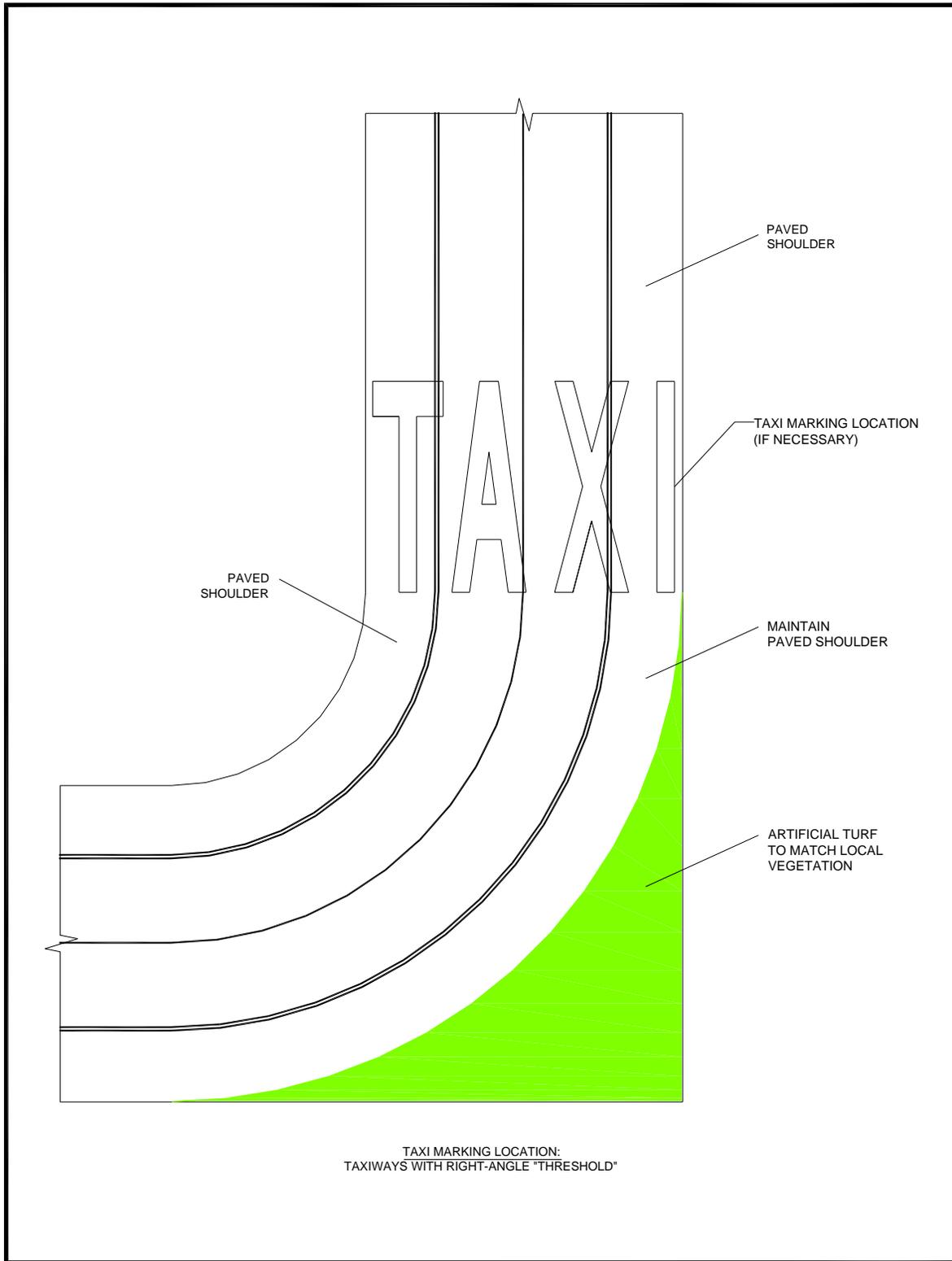
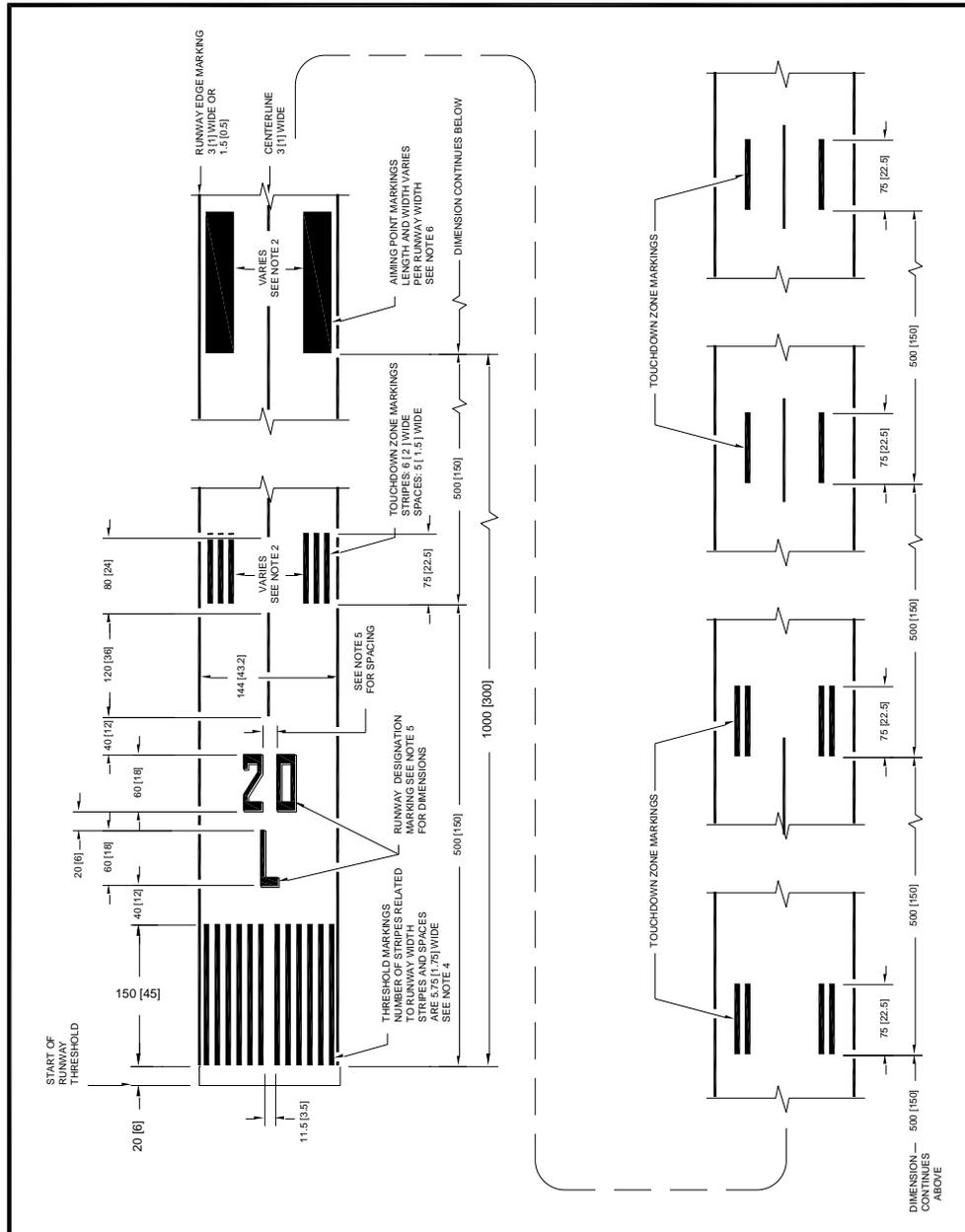


Figure 5-4. Aviation grade artificial turf installation

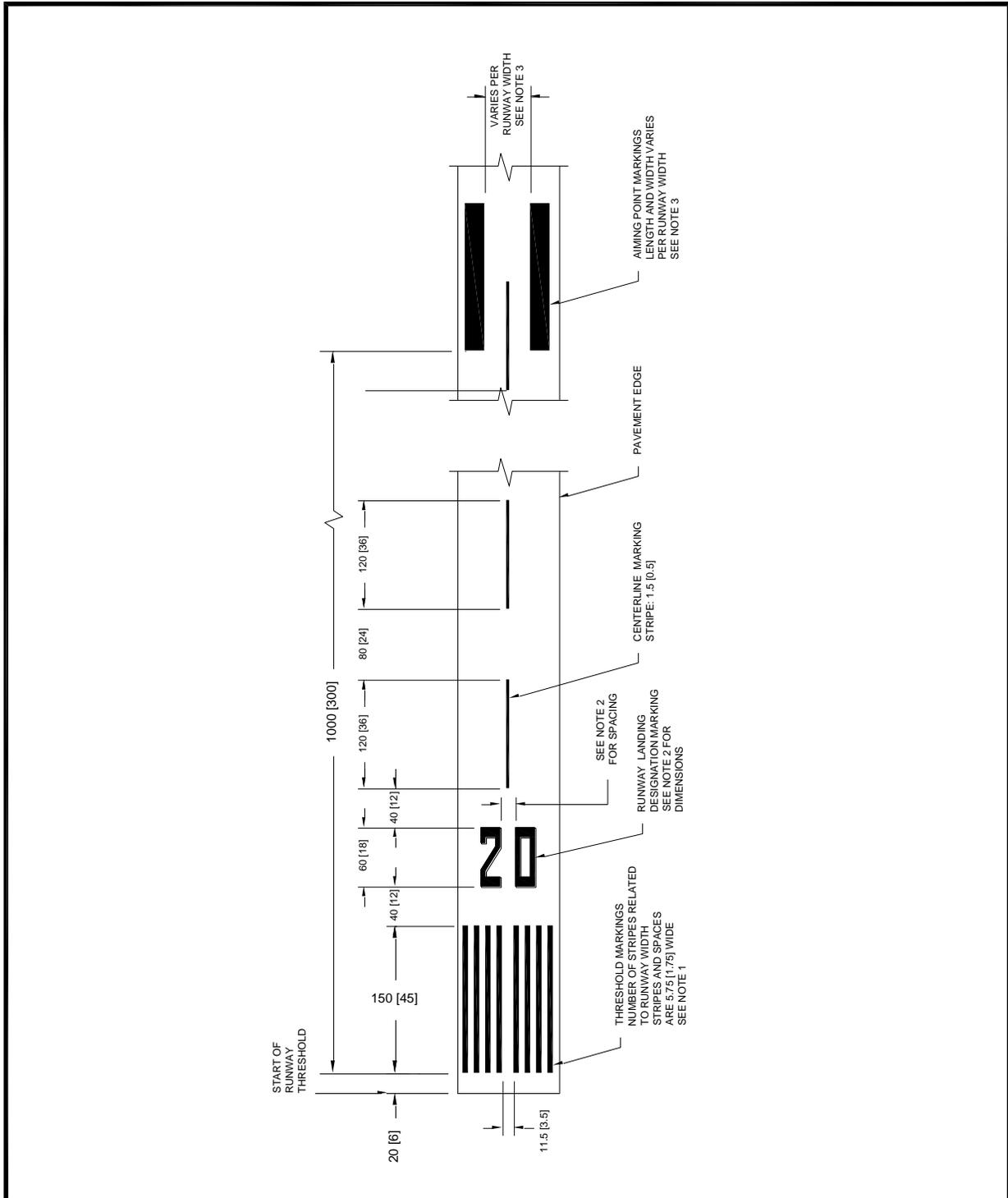
Appendix A. Pavement Markings



Notes:

1. Dimensions are expressed in feet (meters).
2. Dimension varies with runway width. See paragraph 2.6.
3. The touchdown zone marking scheme maintains a 900 ft (275m) “no marking zone” from the midpoint of the runway. That is, those pairs of surface markings that extend within 900 ft (275m) of the runway midpoint are eliminated.
4. See paragraph 2.5.
5. See Figure A-6.
6. See paragraph 2.6.

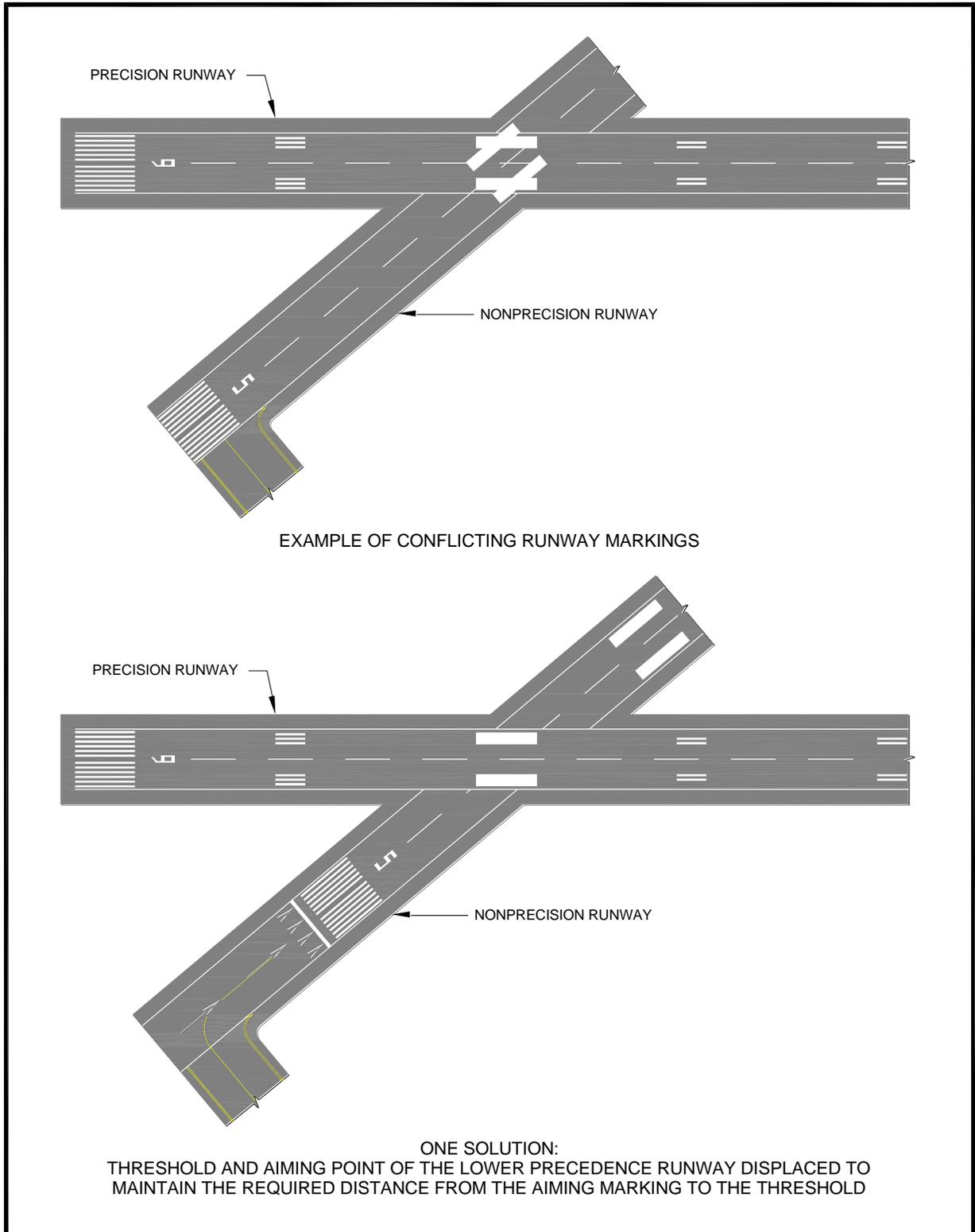
Figure A-1. Precision runway markings



Notes: Dimensions are expressed in feet (meters).

1. See paragraph 2.5 and Table 2-2.
2. See Figure A-6.
3. See paragraph 2.6. See Table 2-1 for when required.

Figure A-2. Non-precision runway



Note: In lieu of displaced threshold, the airport operator may place a remark on FAA Form 5010 which provides the distance that exists between the threshold and the aiming point marking.

Figure A-4. Example of conflicting markings on crossing runways

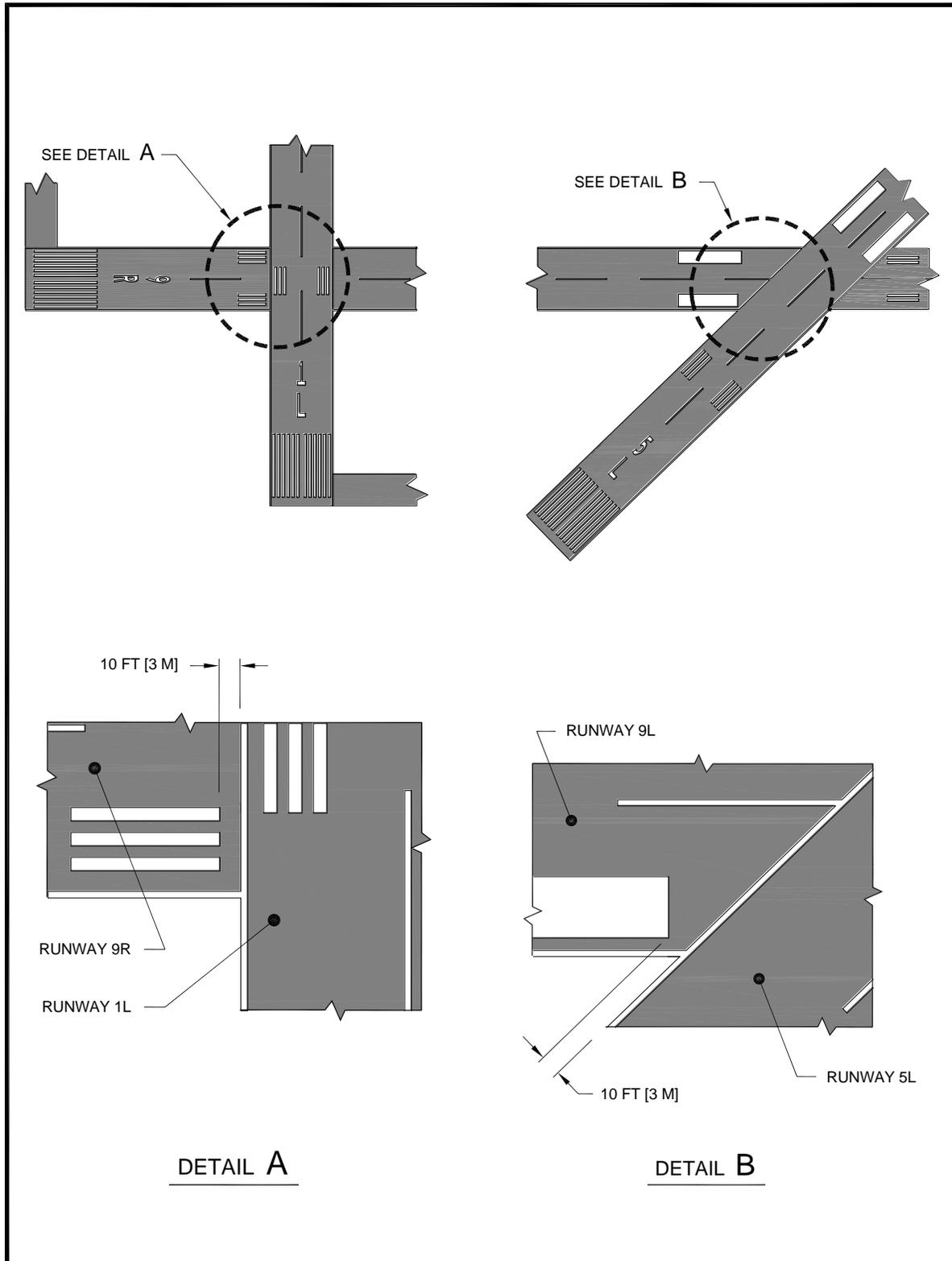
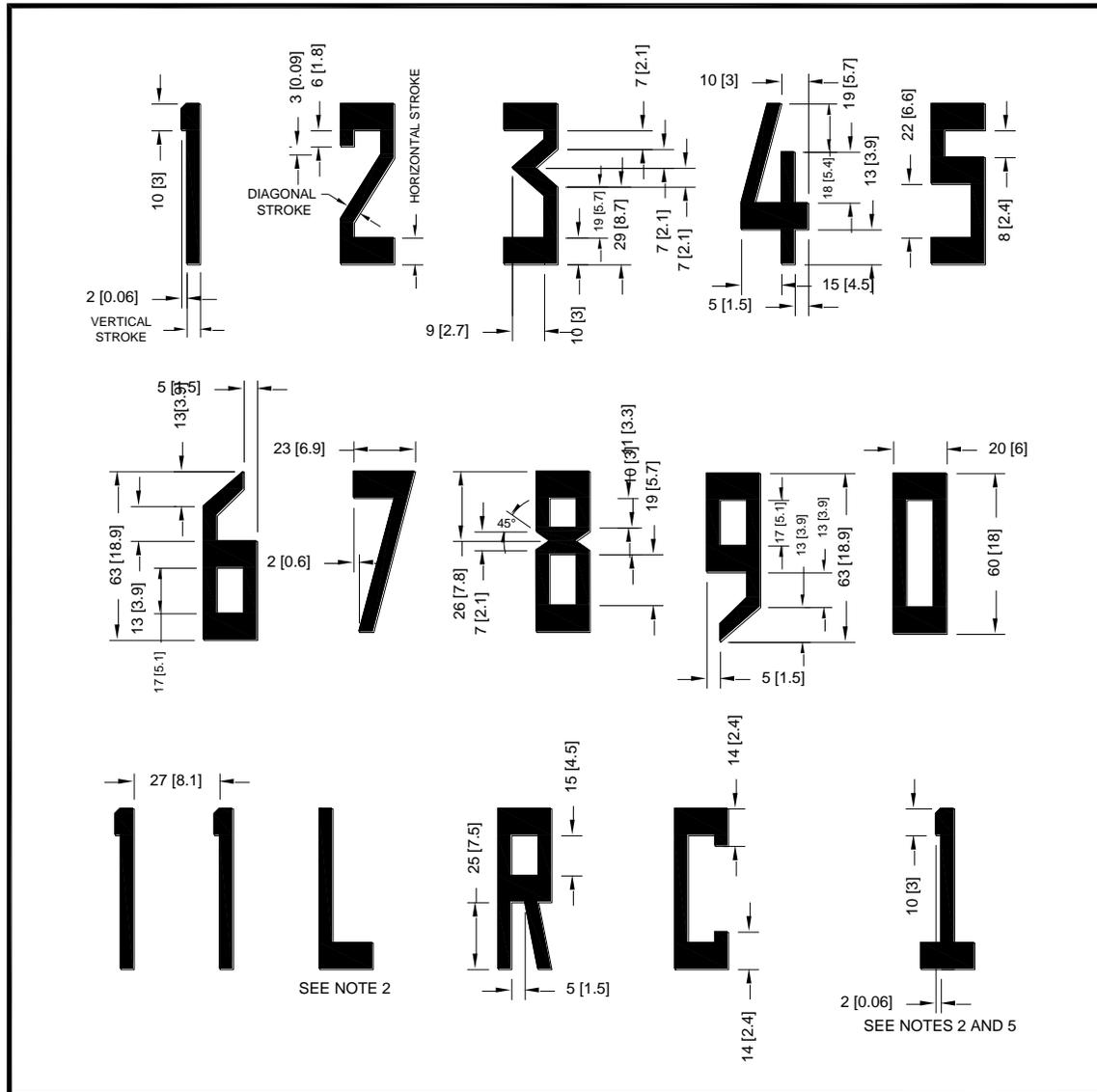


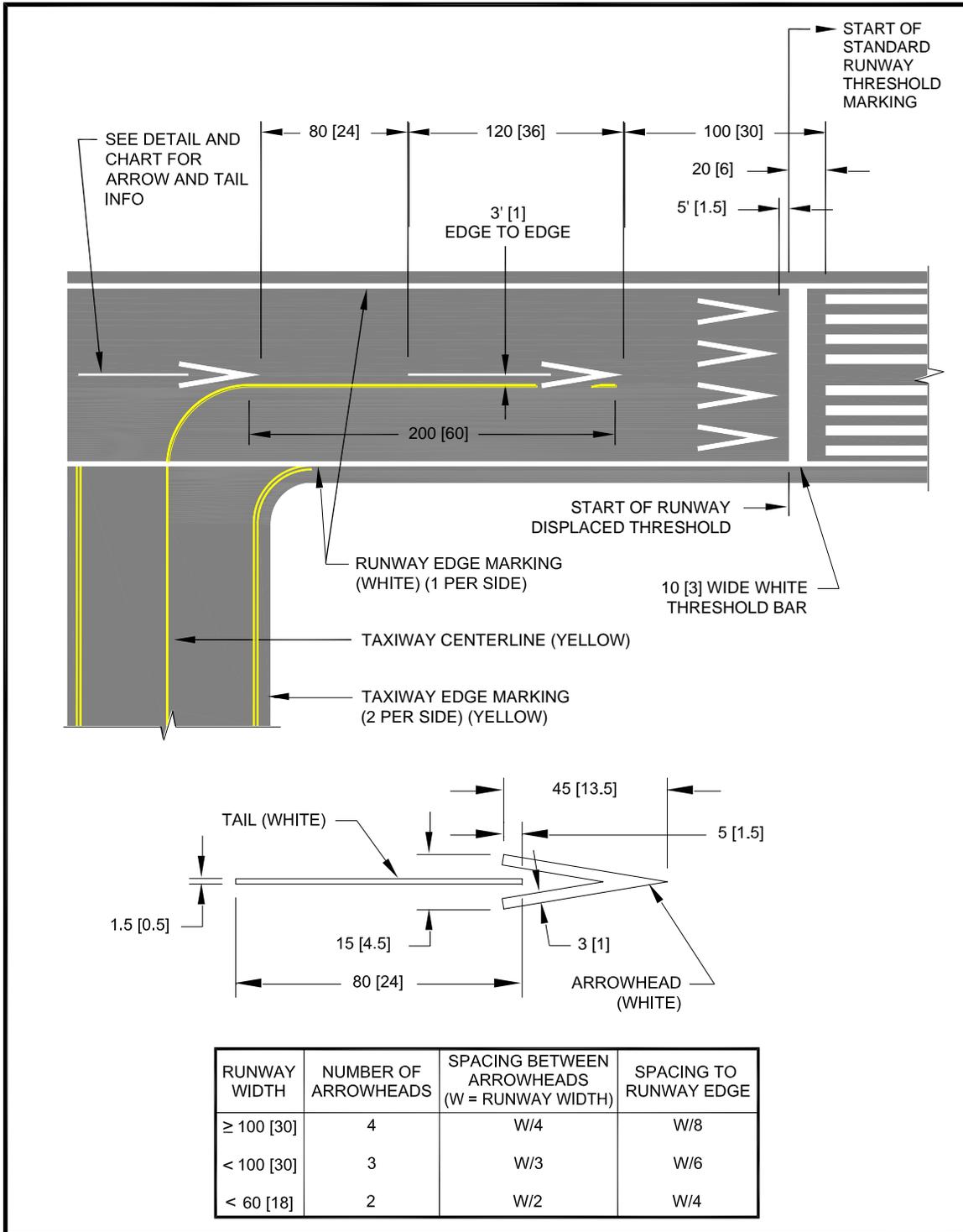
Figure A-5. Details of markings for intersecting runways



Notes:

1. Dimensions are expressed in feet (meters).
2. All characters have these characteristics (unless otherwise specified):
 - 60 [18] high
 - 20 [6] wide
 - vertical stroke of 5 [1.5]
 - horizontal stroke of 10 [30]
 - diagonal stroke of 5 [1.5]
3. All numerals except the number eleven as shown are horizontally spaced 15 [4.5] apart.
4. Single digits must not be preceded by a zero.
5. The numeral “1”, when used alone, contains a horizontal stroke, as shown, to differentiate it from the runway centerline marking.
6. Single designations are centered on the runway pavement centerline. For double designations, the center of the outer edges of the two numerals is centered on the runway pavement centerline.
7. Where the runway designation consists of a number and a letter, the number and letter are located on the runway centerline in a stacked arrangement as shown in [Figure A-1](#).

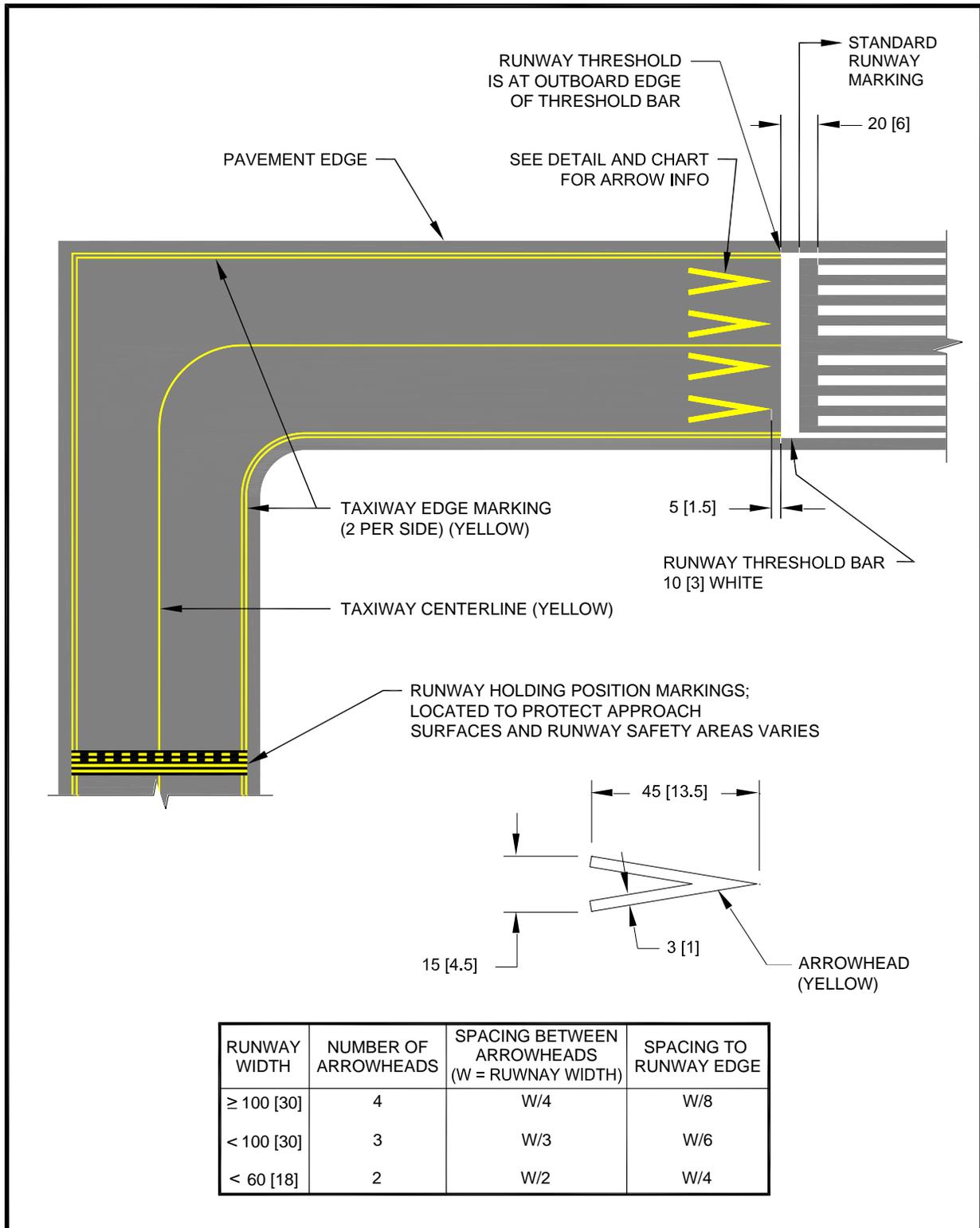
Figure A-6. Runway designation numerals and letters



Notes:

1. Dimensions are expressed in feet (meters).
2. Runway edge markings, when used on the runway, extend into the displaced area.
3. Runway markings (except holding position markings) including those in the displaced threshold are white.

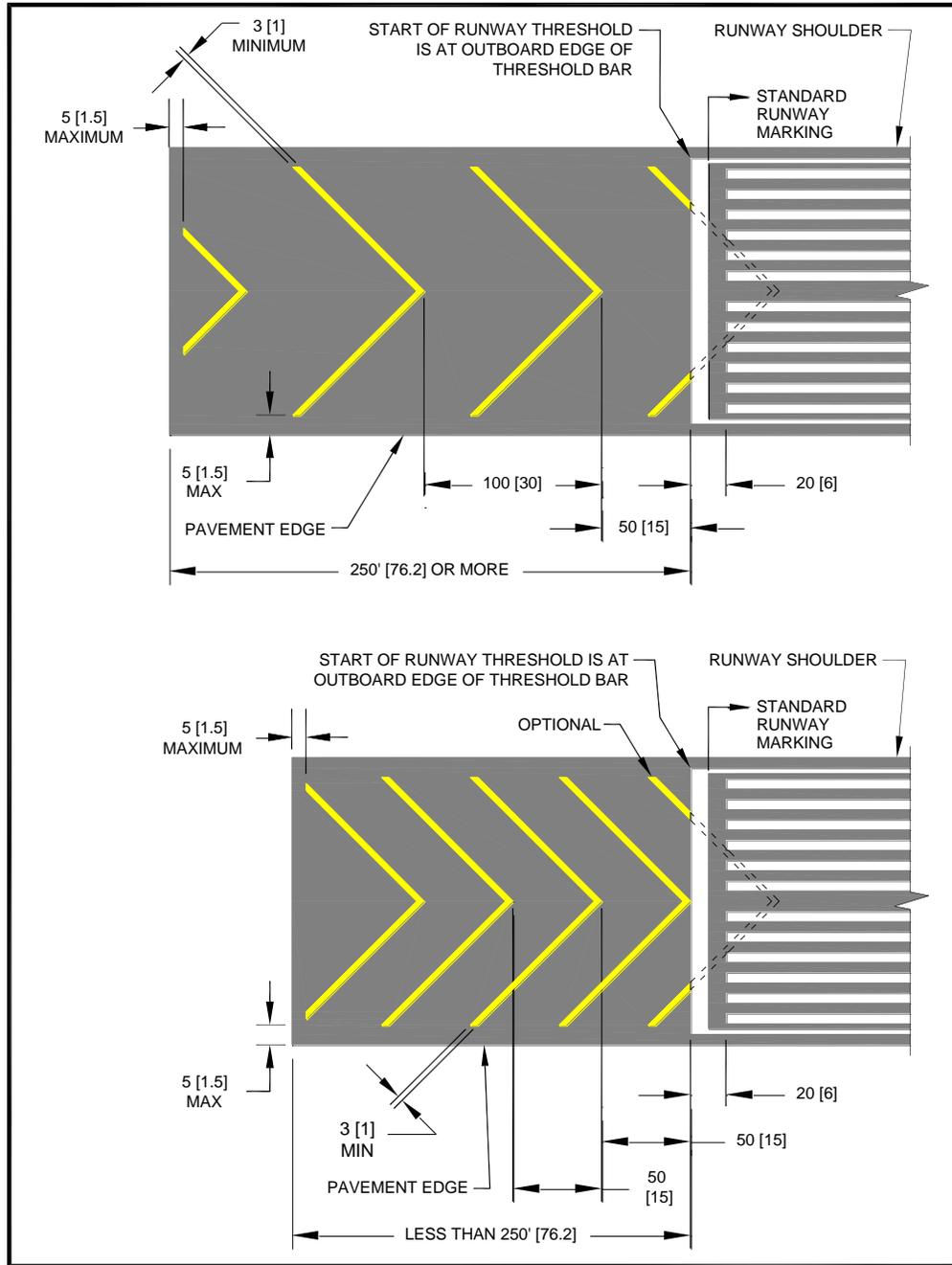
Figure A-7. Displaced threshold markings



Notes:

1. Dimensions are expressed in feet (meters).

Figure A-8. Marking for aligned taxiway with runway without a displaced threshold



Notes:

1. Dimensions are expressed in feet (meters).
2. The widths of the stopways and blast pads are not the same. Stopways equal runway width. Blast pads equal runway width plus runway shoulders. See AC 150/5300-13.
3. 50 ft (15m) spacing may be used when length of area is less than 250 ft (7.5m) in which case the first full chevron starts at the index point (intersection of runway centerline and runway threshold).
4. Chevrons are painted yellow and at an angle of 45° to the runway centerline.
5. Chevron spacing may be doubled if length of area exceeds 1000 ft (300m).
6. For stopways of less than 250 feet in length, only full chevrons are required with the option to paint partial chevrons.

Figure A-9. Markings for blast pads and stopways

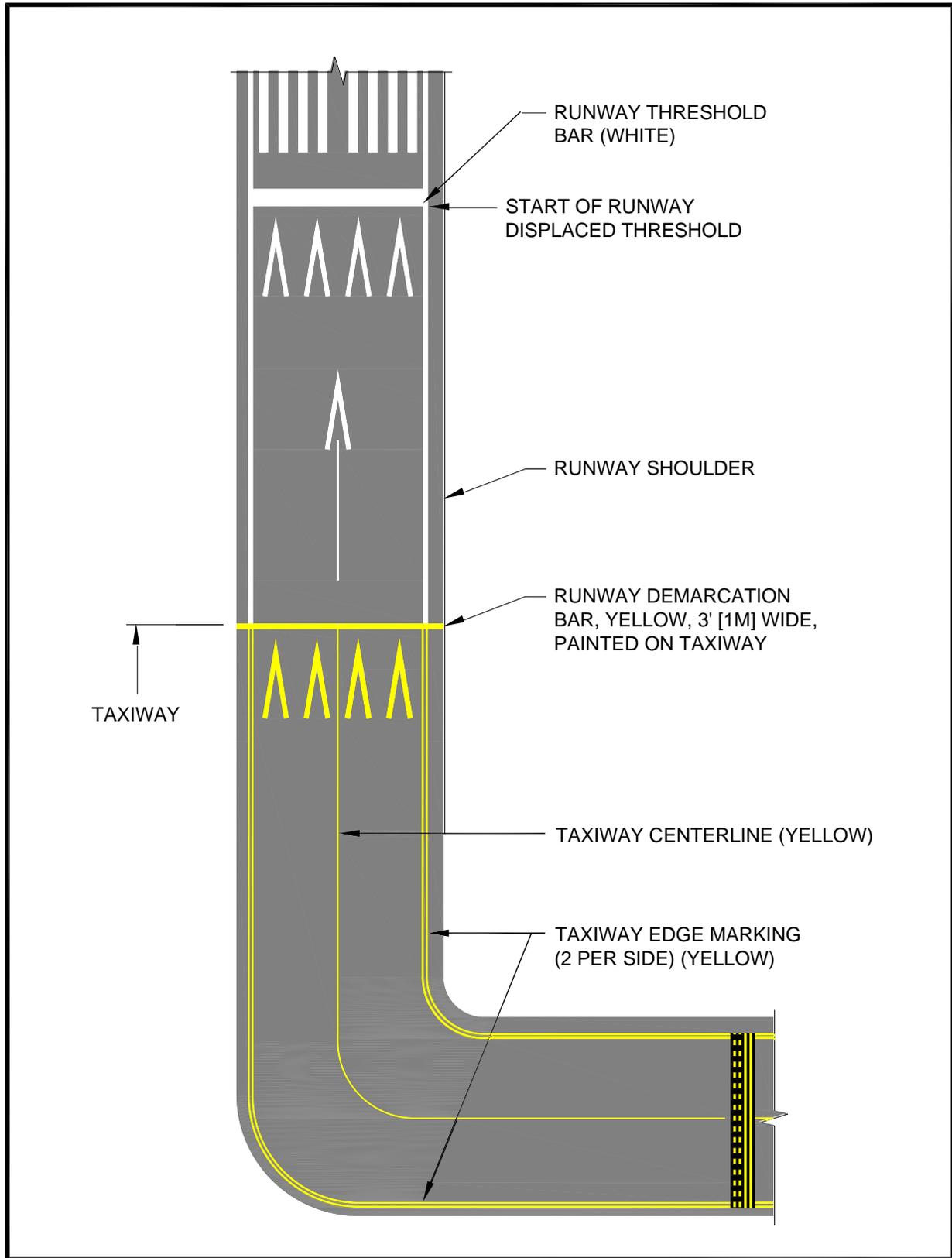
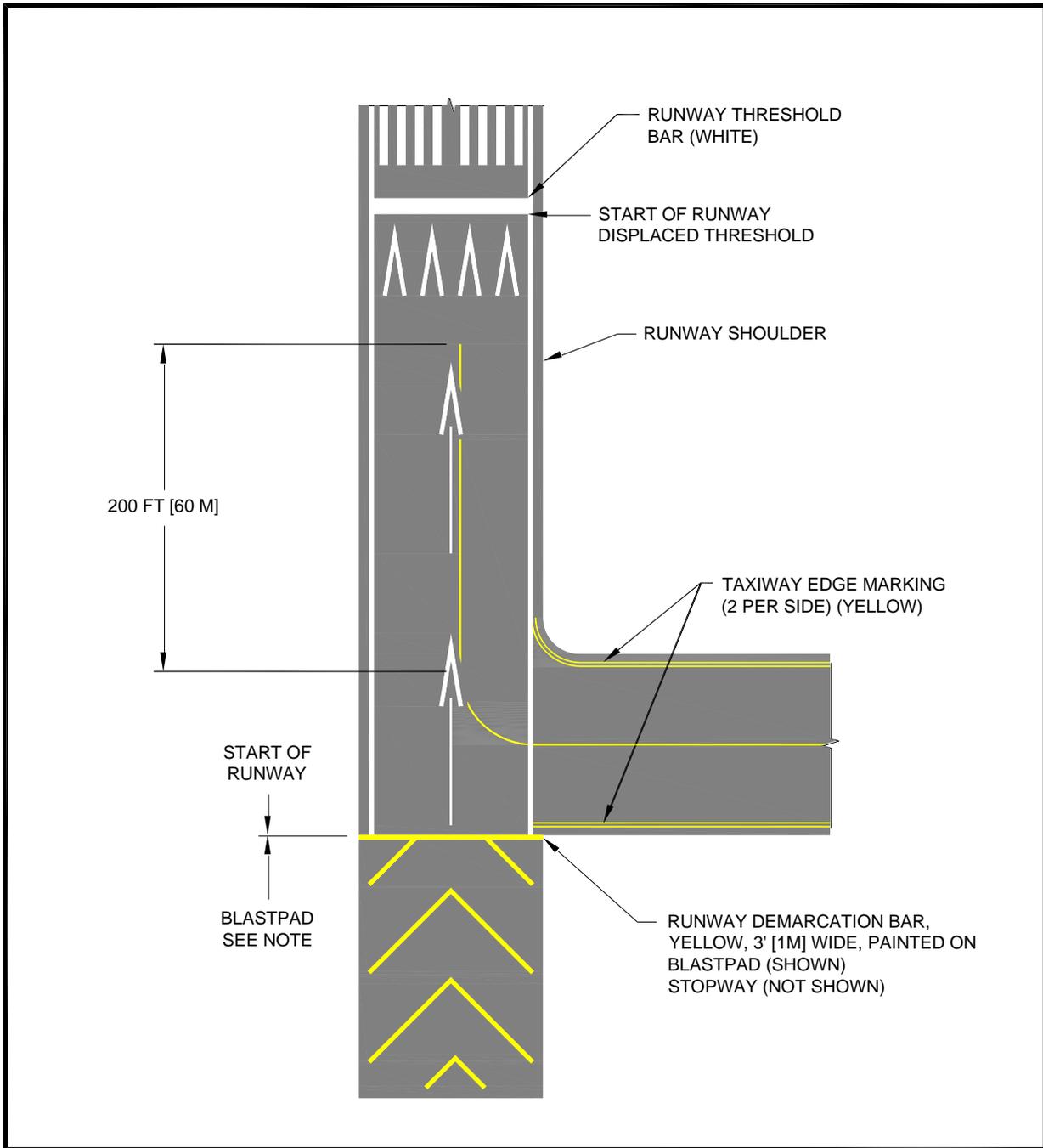


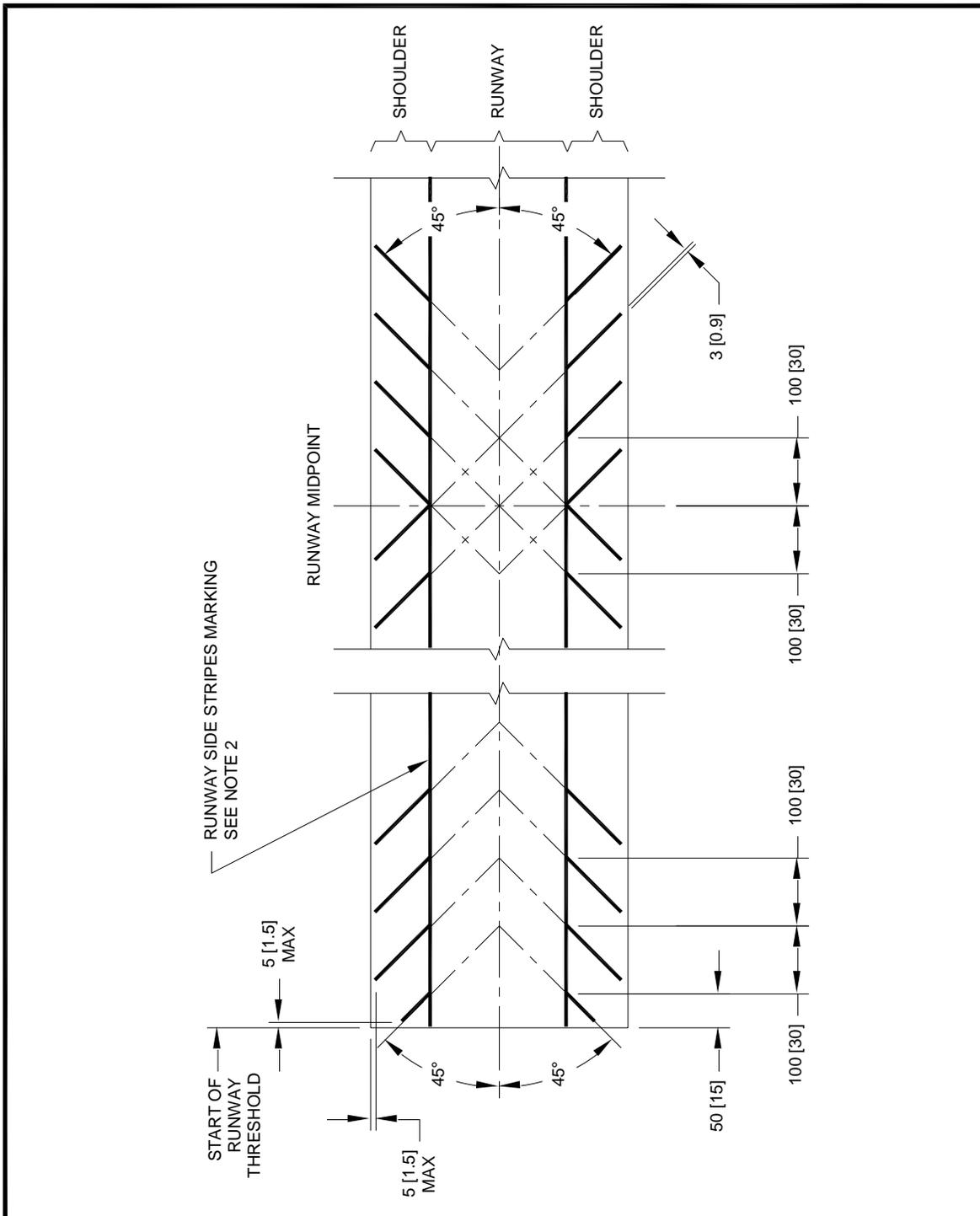
Figure A-10. Markings for aligned taxiway preceding a displaced threshold



Notes:

1. Stopway width equals runway width.
2. Blastpad width equals runway width plus runway shoulders.

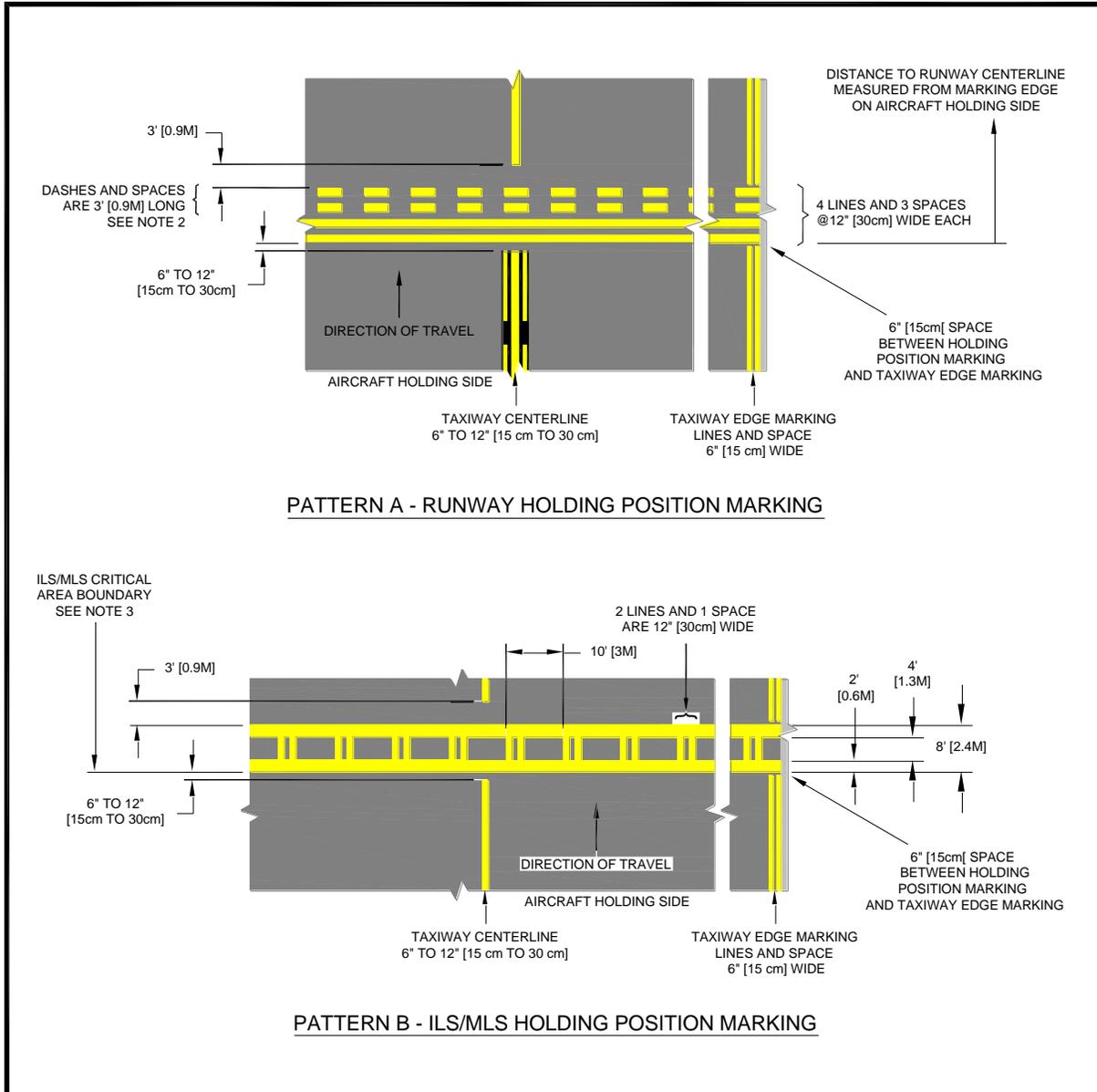
Figure A-11. Markings for blast pad preceding a displaced threshold



Notes:

1. Dimensions are expressed in feet (meters).
2. Runway shoulder markings are used only in conjunction with runway edge markings.
3. Runway shoulder markings are painted yellow.

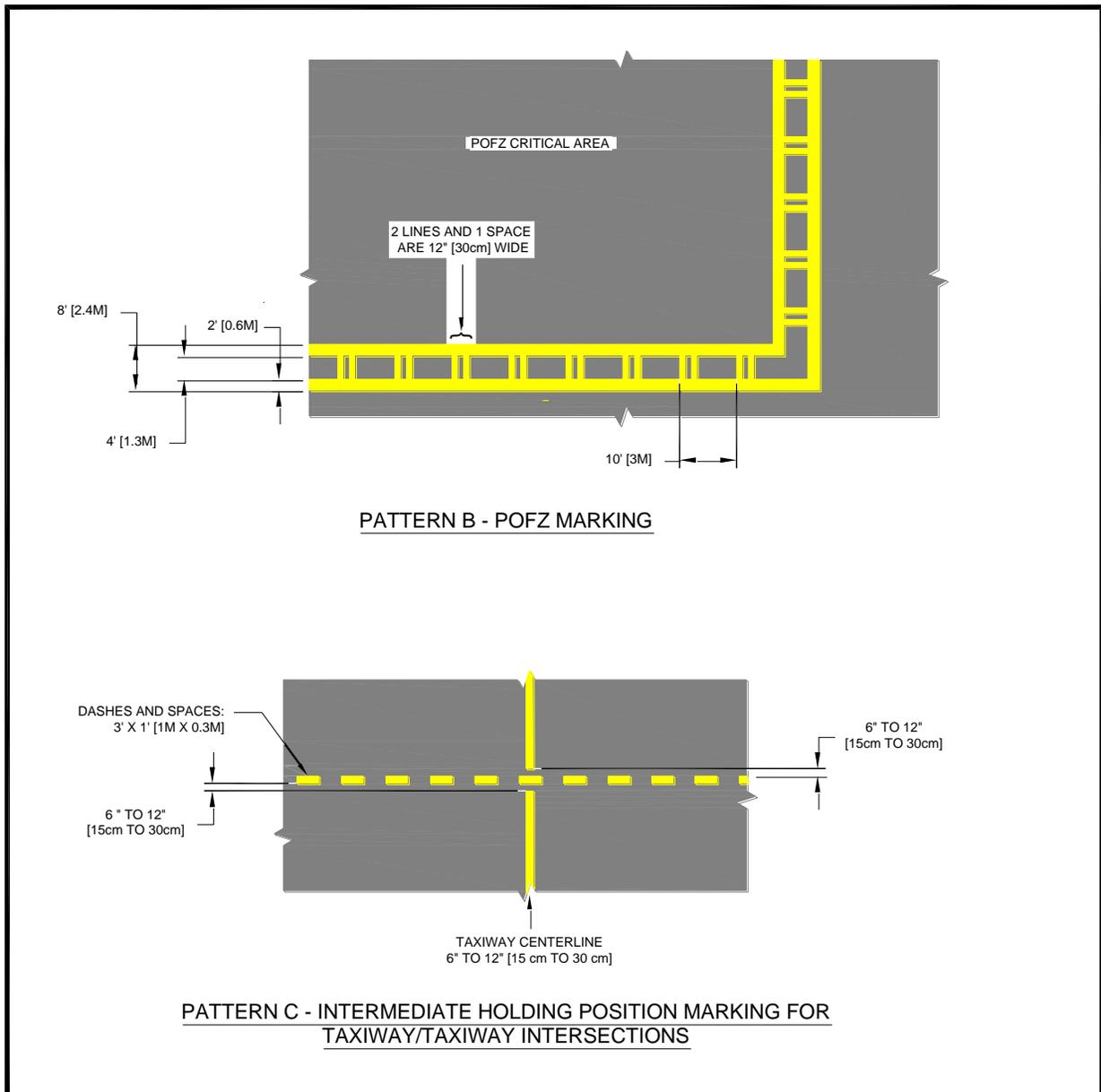
Figure A-12. Runway shoulder markings



Notes:

1. Unless otherwise notes, all lines are yellow.
2. See paragraph 3.3 for reductions.
3. See paragraph 3.4 for reductions.
4. Dimensions shown do not account for outline marking in black paint when on light-colored pavement. See paragraph 1.4 and Appendix C.
5. See Table 1-1 for general guidelines for black borders on light-colored pavements.

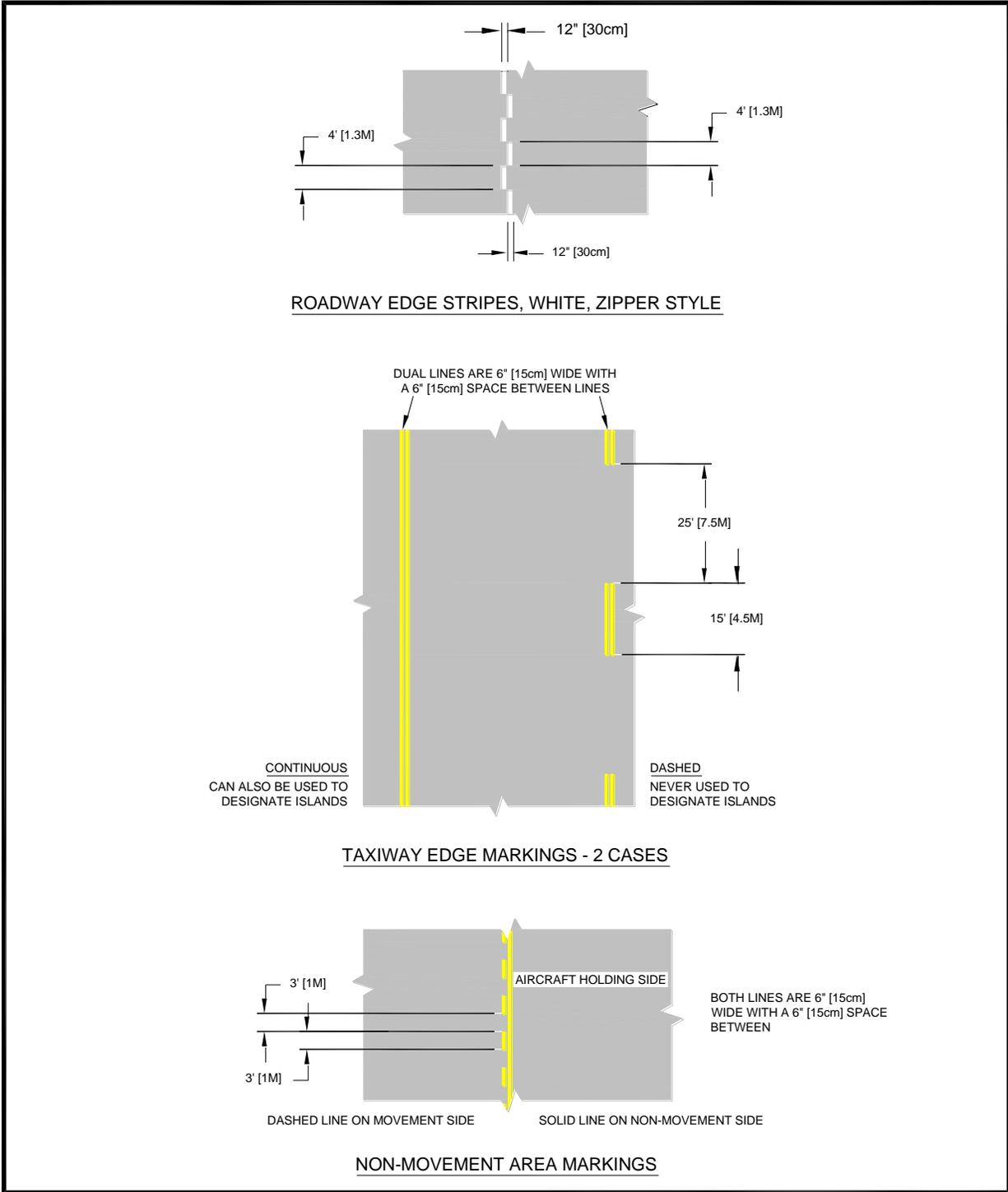
Figure A-13. Holding position marking details



Notes:

1. Unless otherwise noted all lines are yellow.
2. Dimensions shown do not account for outline marking in black paint when on light-colored pavement. See paragraph 1.4 and Appendix C.
3. See Table 1-1 for general guidelines for black borders on light-colored pavements.

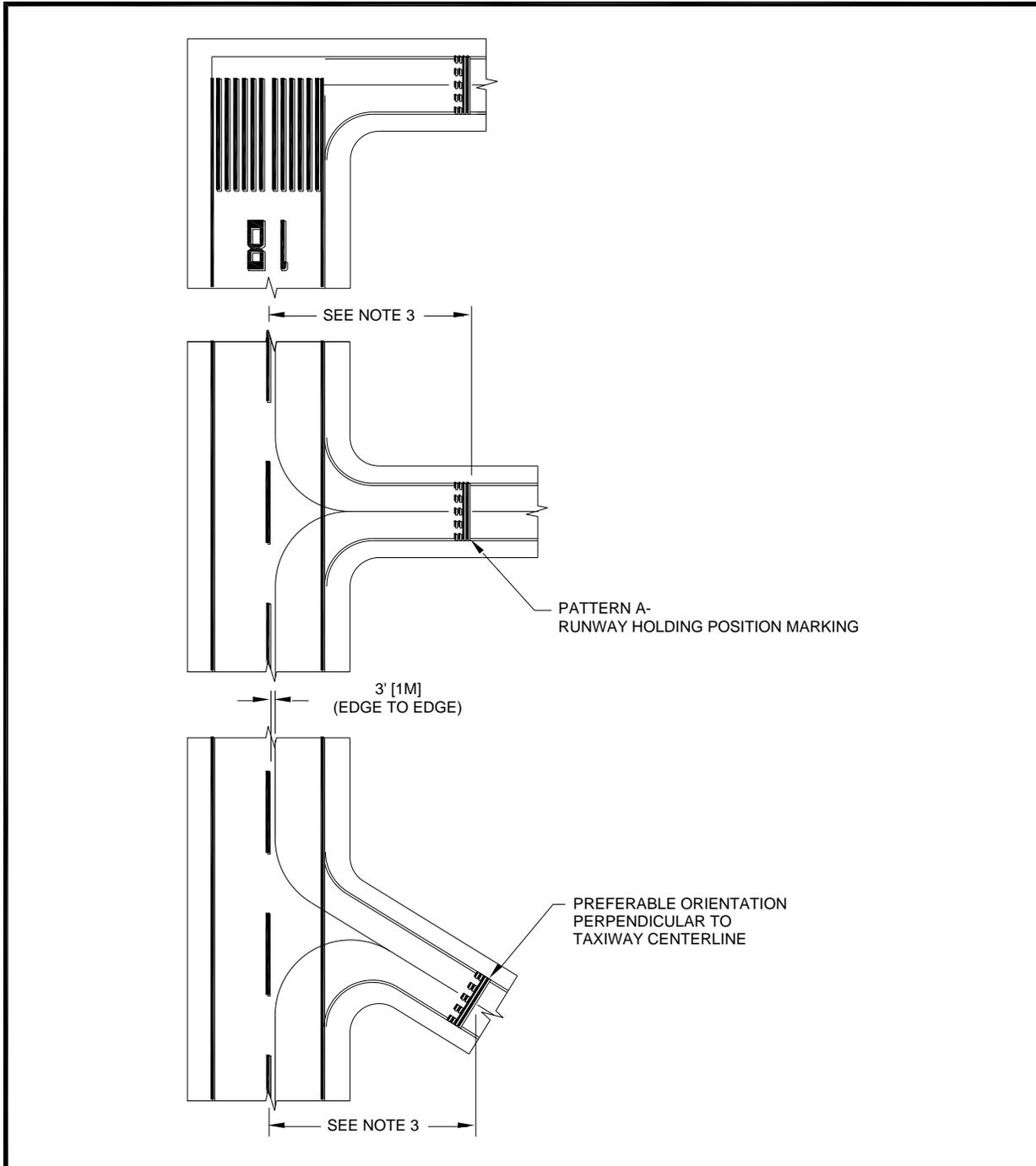
Figure A-14. Holding position marking details



Notes:

1. Unless otherwise noted all lines are yellow.
2. Dimensions shown do not account for black outline of enhanced taxiway marking. See paragraph 1.4 and Appendix C.

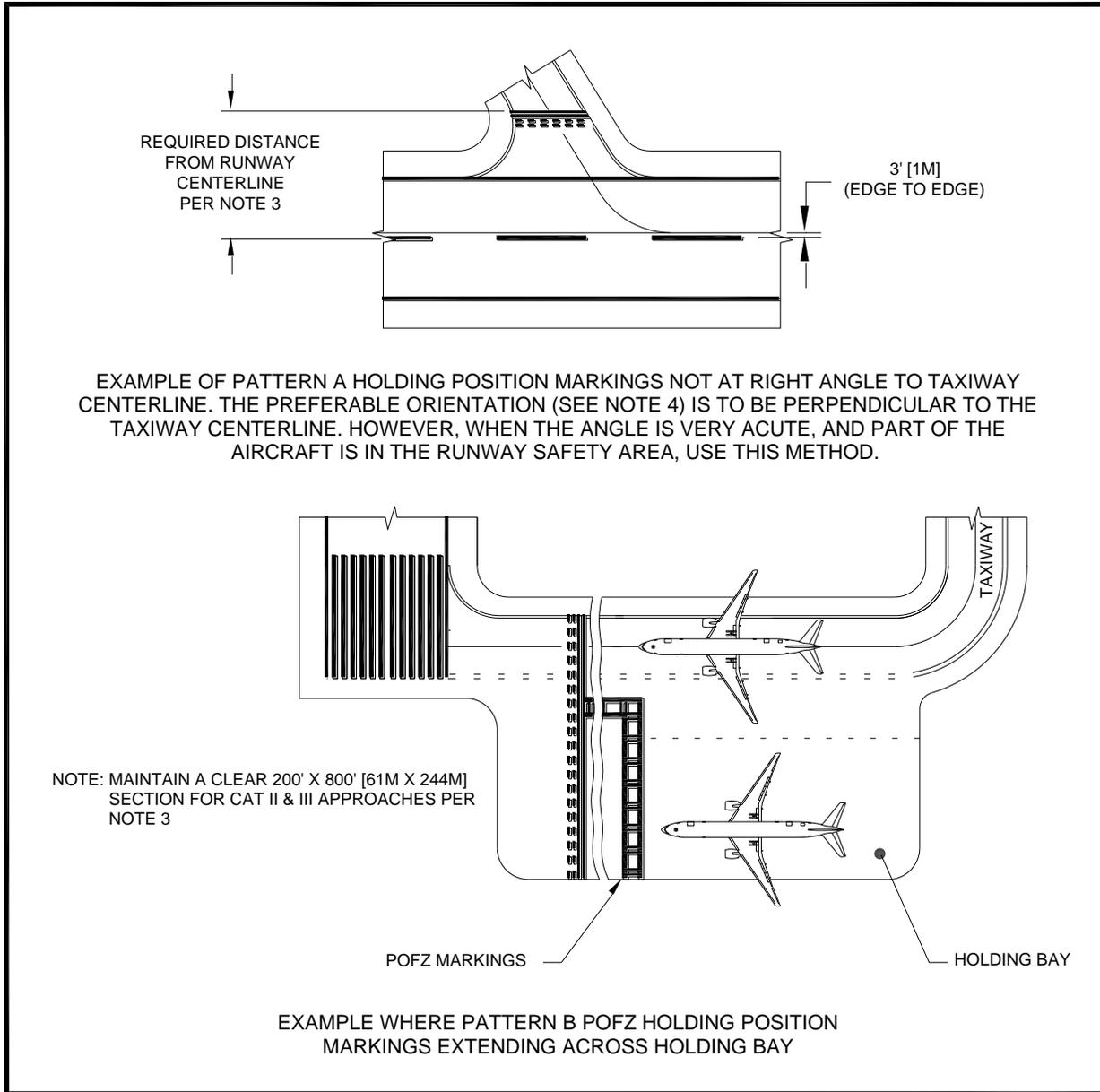
Figure A-15. Taxiway markings



Notes:

1. Refer to [Figure A-1](#), [Figure A-13](#) and [Figure A-14](#) for dimensions off the runway and taxiway markings identified in this figure.
2. Refer to [AC 150/5340-18](#) for sign requirements at holding position markings.
3. Refer to [AC 150/5300-13](#).

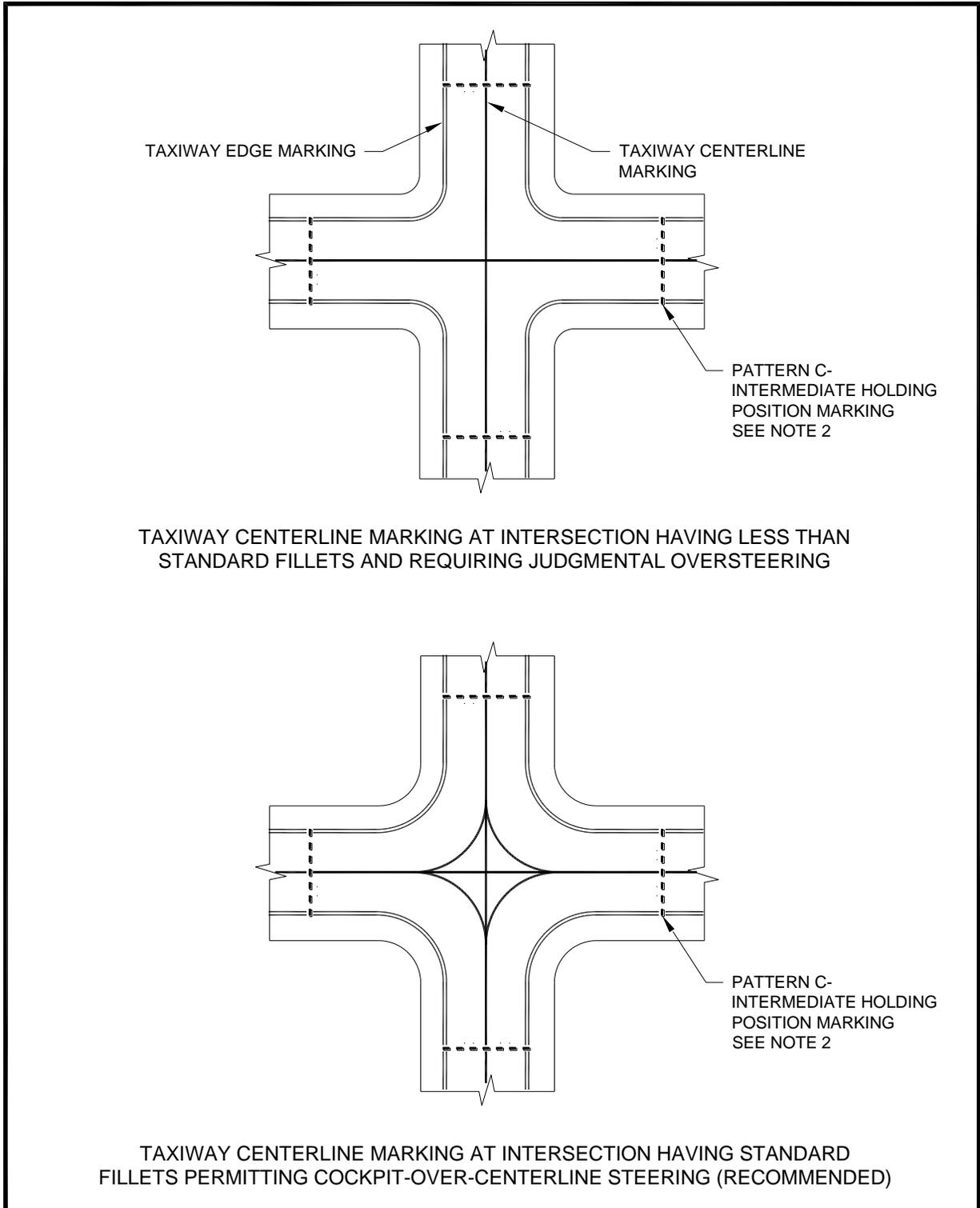
Figure A-16. Taxiway markings



Notes:

1. Refer to [Figure A-1](#), [Figure A-13](#) and [Figure A-14](#) for dimensions off the runway and taxiway markings identified in this figure.
2. Refer to [AC 150/5340-18](#) for sign requirements at holding position markings.
3. Refer to [AC 150/5300-13](#).
4. Refer to [Figure A-14](#).

Figure A-17. Taxiway markings



Notes:

1. Refer to [Figure A-12](#) and [Figure A-13](#) for dimensions of the taxiway marking identified in this figure.
2. Refer to [Figure A-13](#).

Figure A-18. Methods for taxiway centerline marking

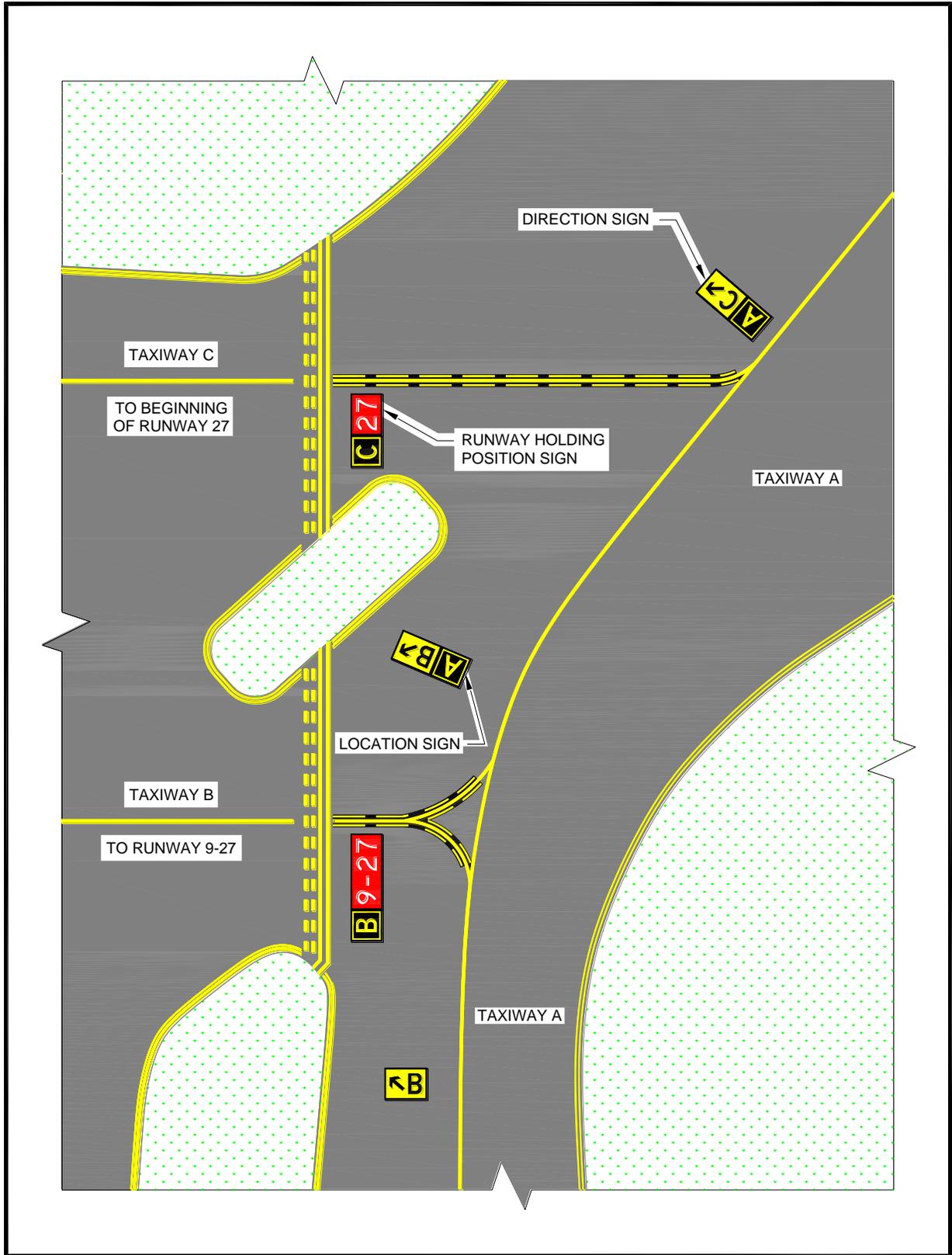


Figure A-19. Surface painted signs

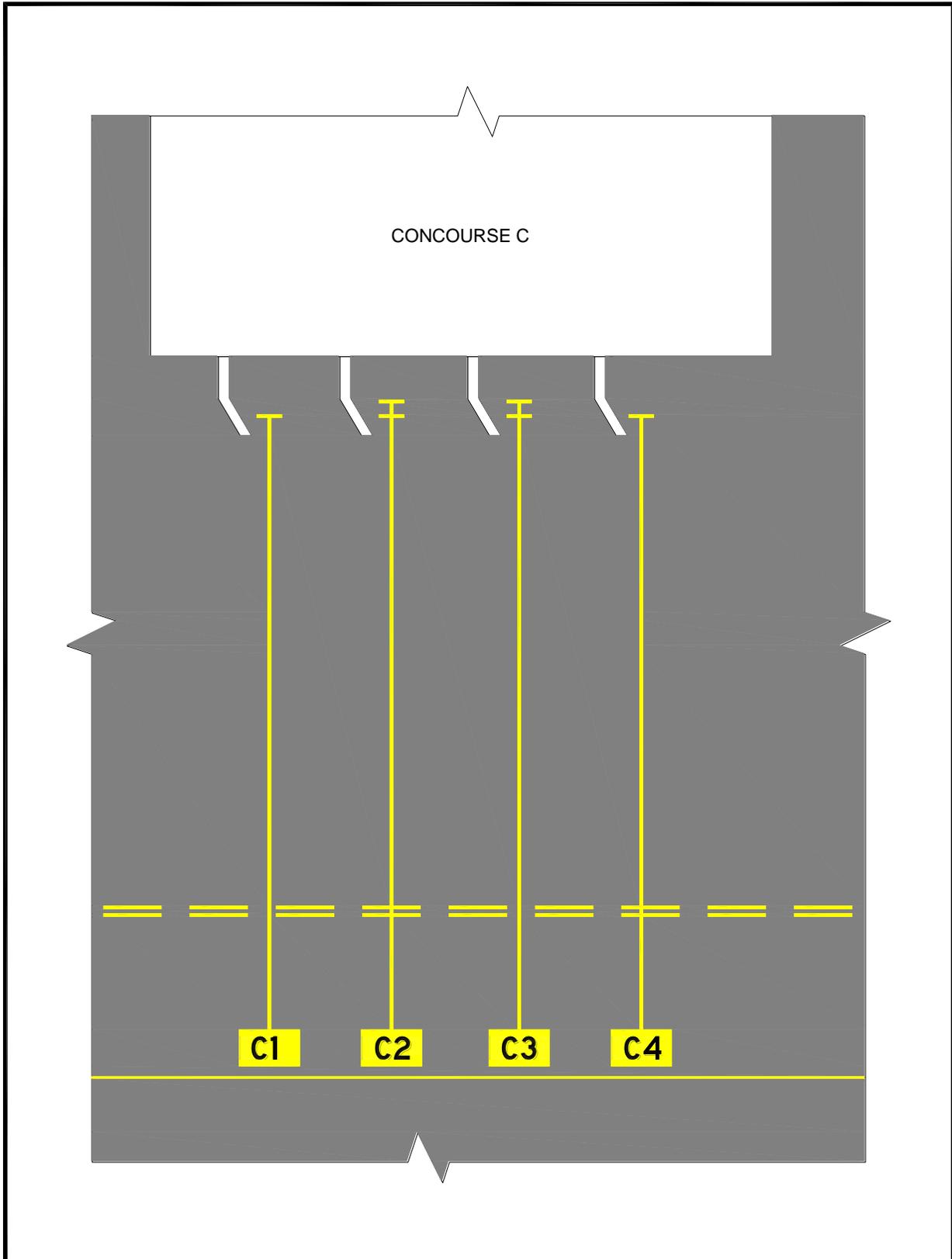


Figure A-20. Surface painted gate identification signs

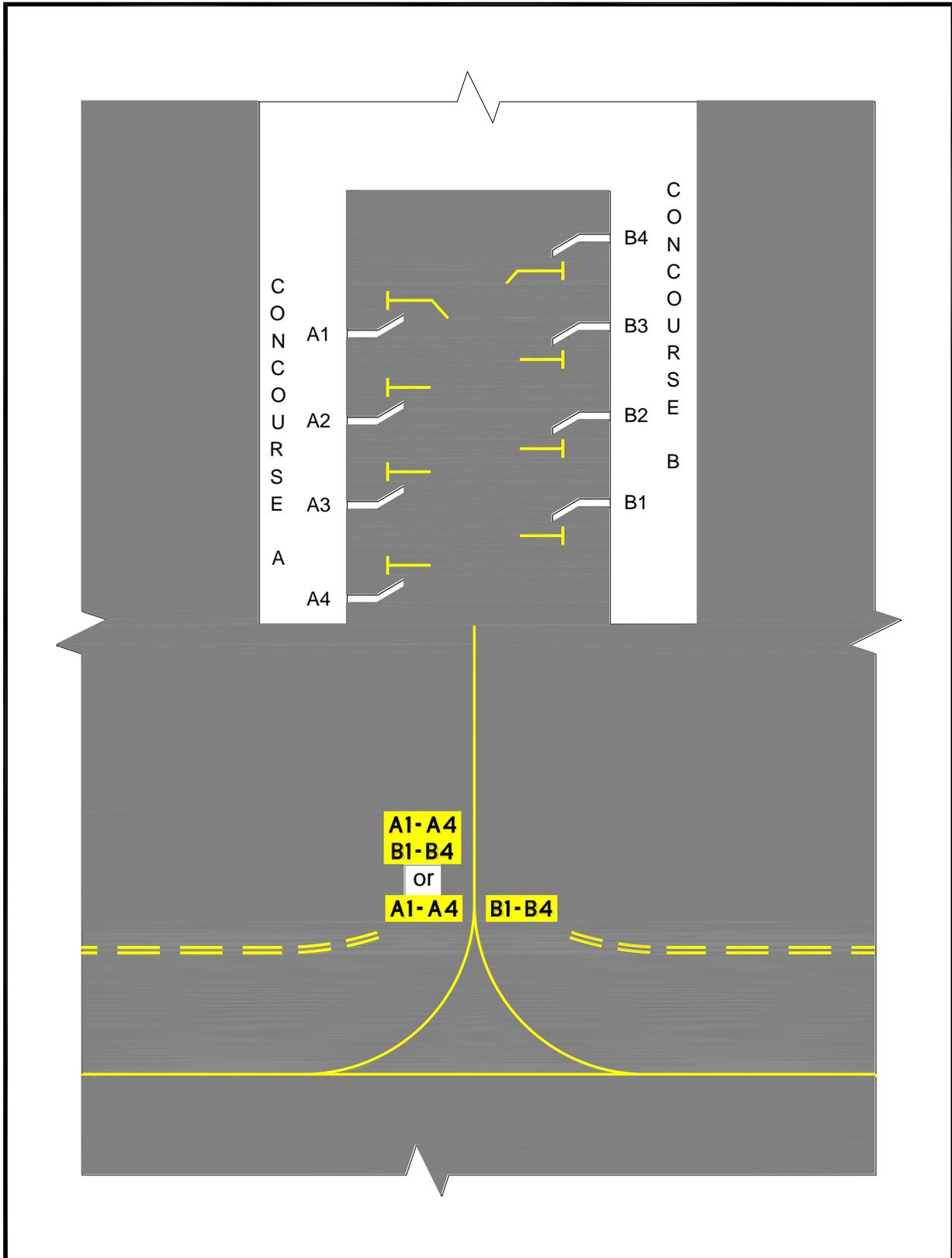
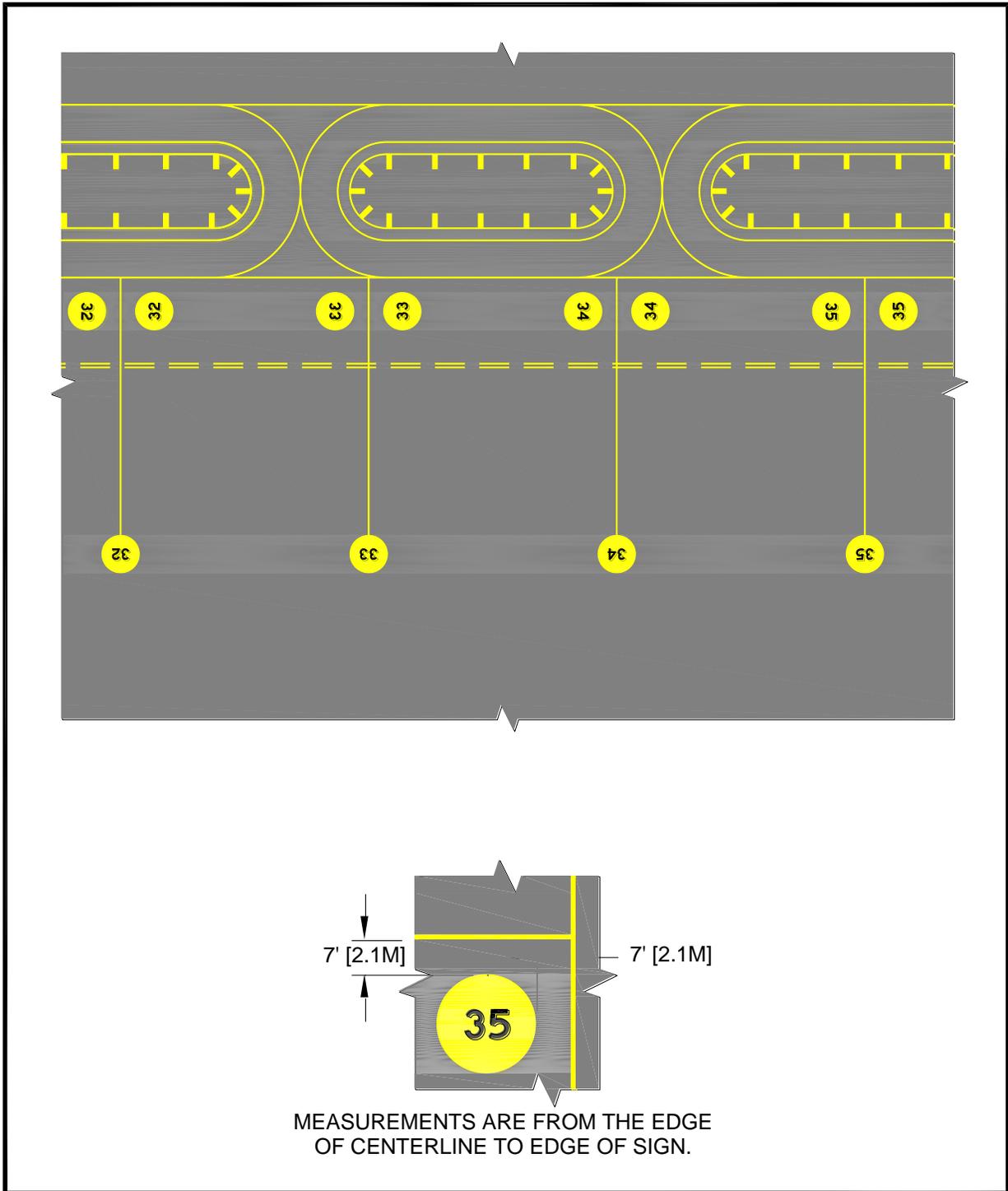
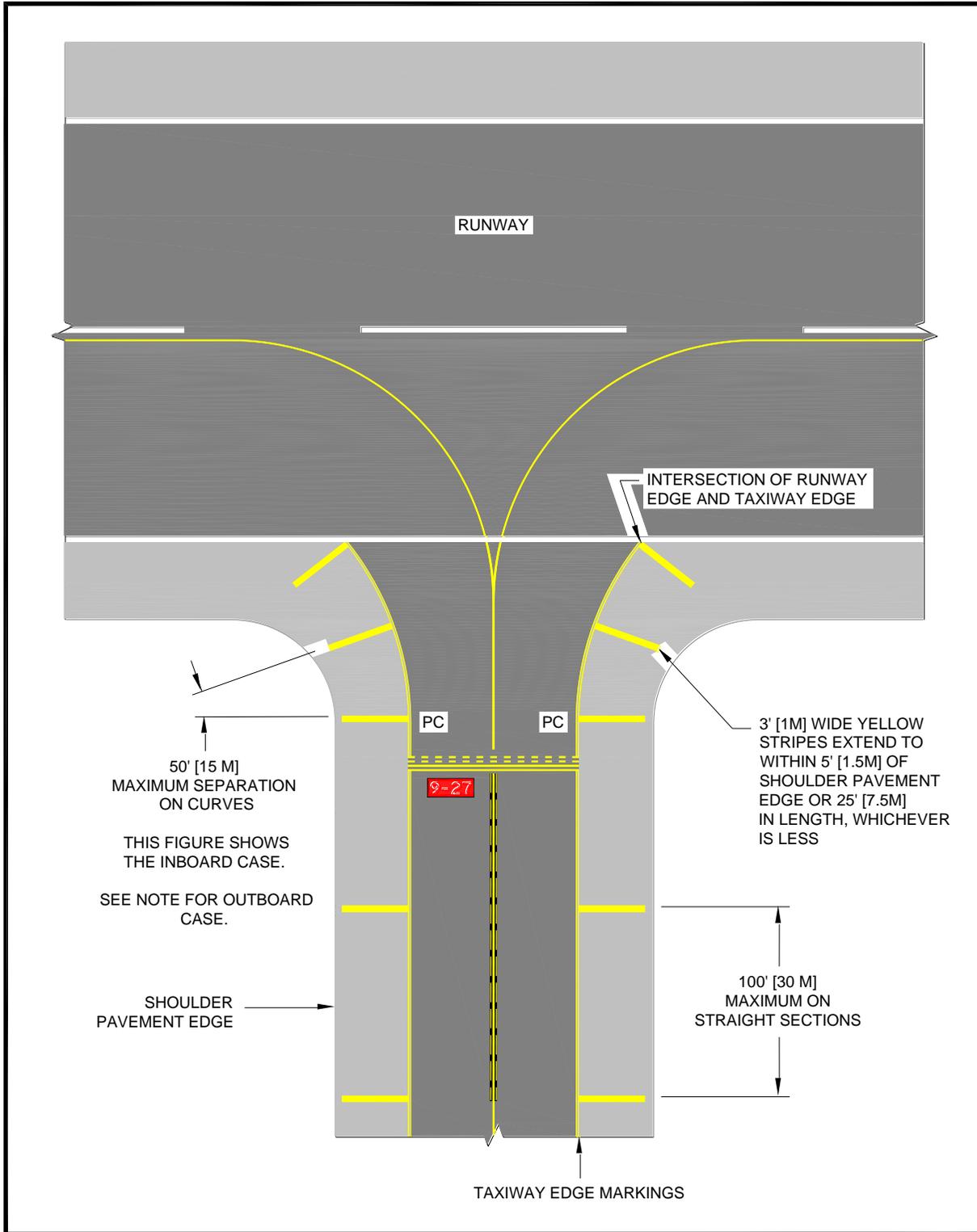


Figure A-21. Multiple gate signs



Note: Centerline at apron entrance point locations may be marked with a radius marking rather than with a “T” configuration, as shown.

Figure A-22. Surface painted apron entrance point signs



- Notes:** 1. See paragraph 4.10.c(2).
2. PC –Point of Curvature

Figure A-23. Taxiway shoulder markings

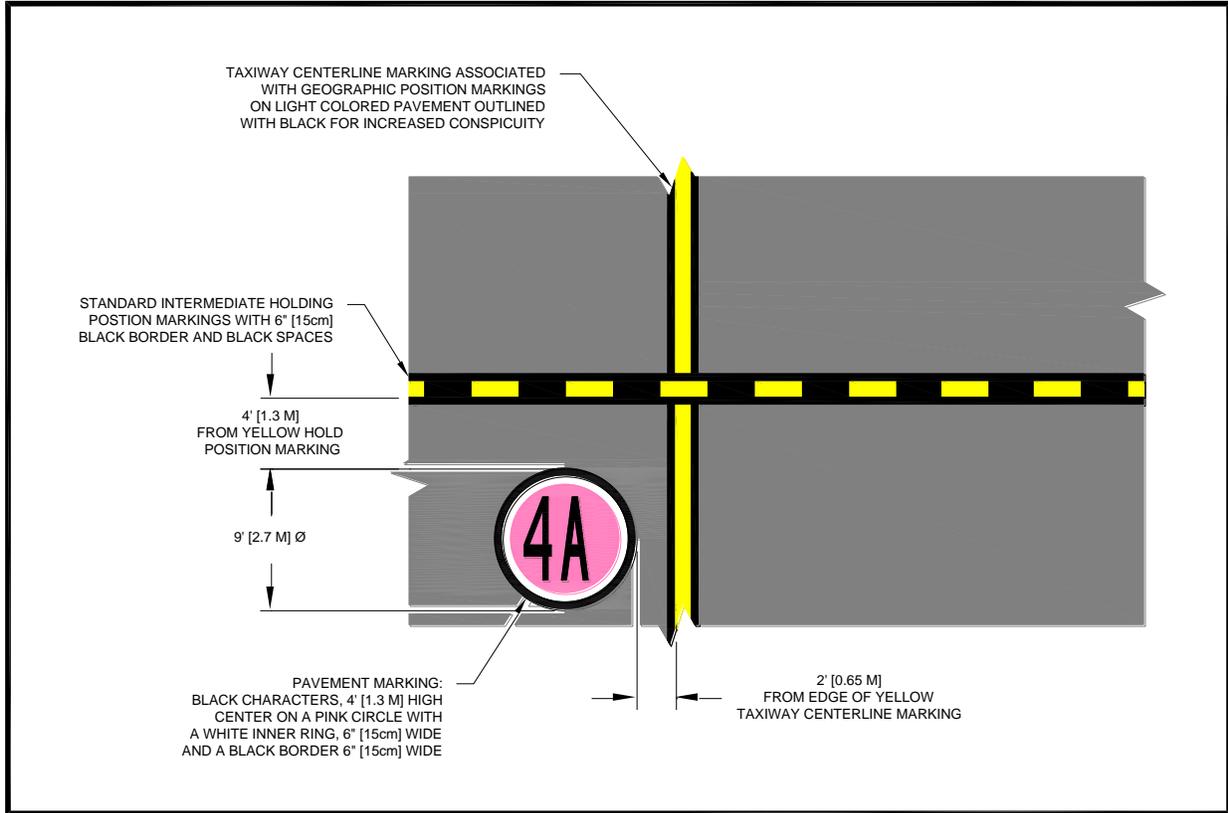
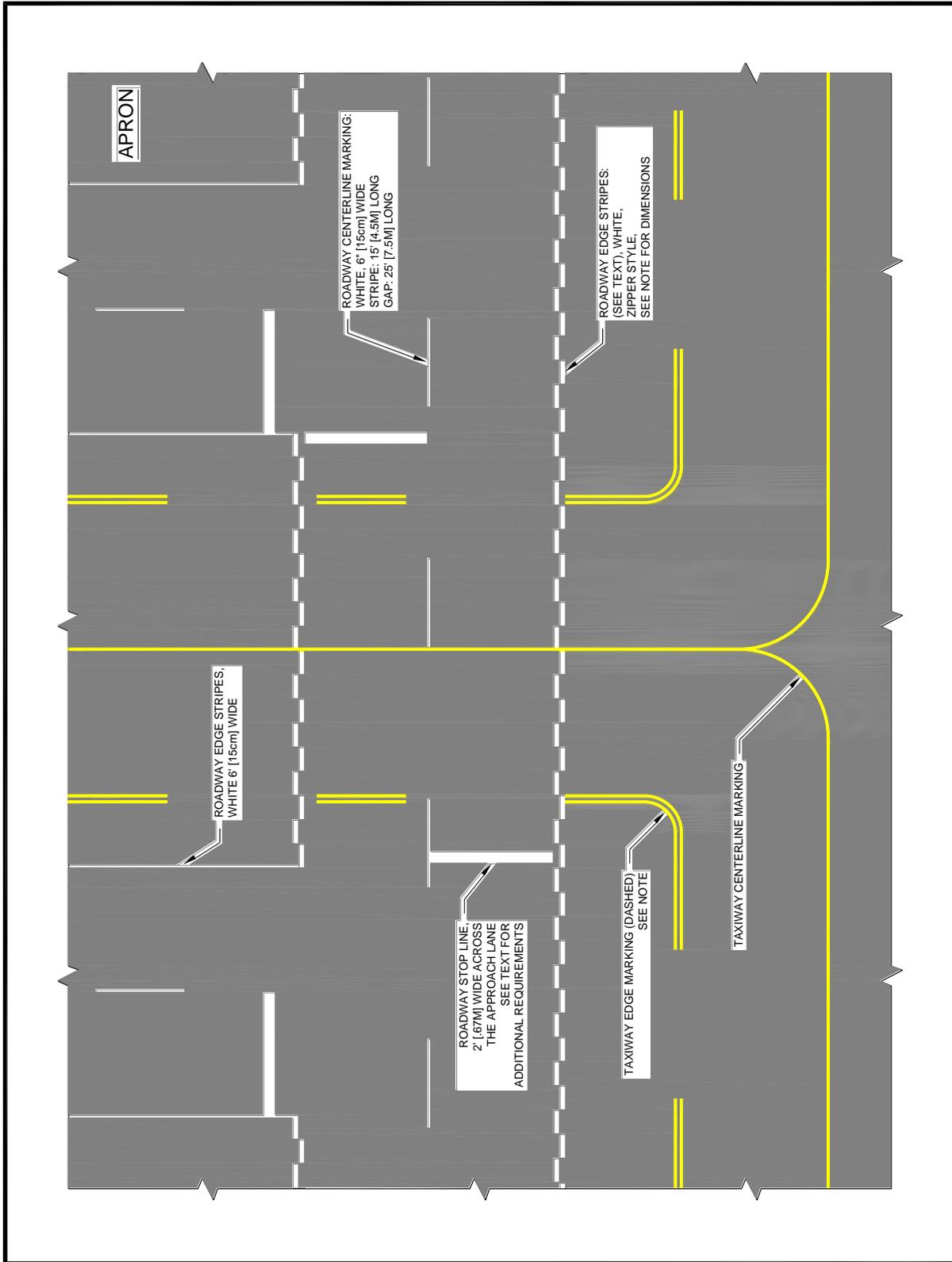
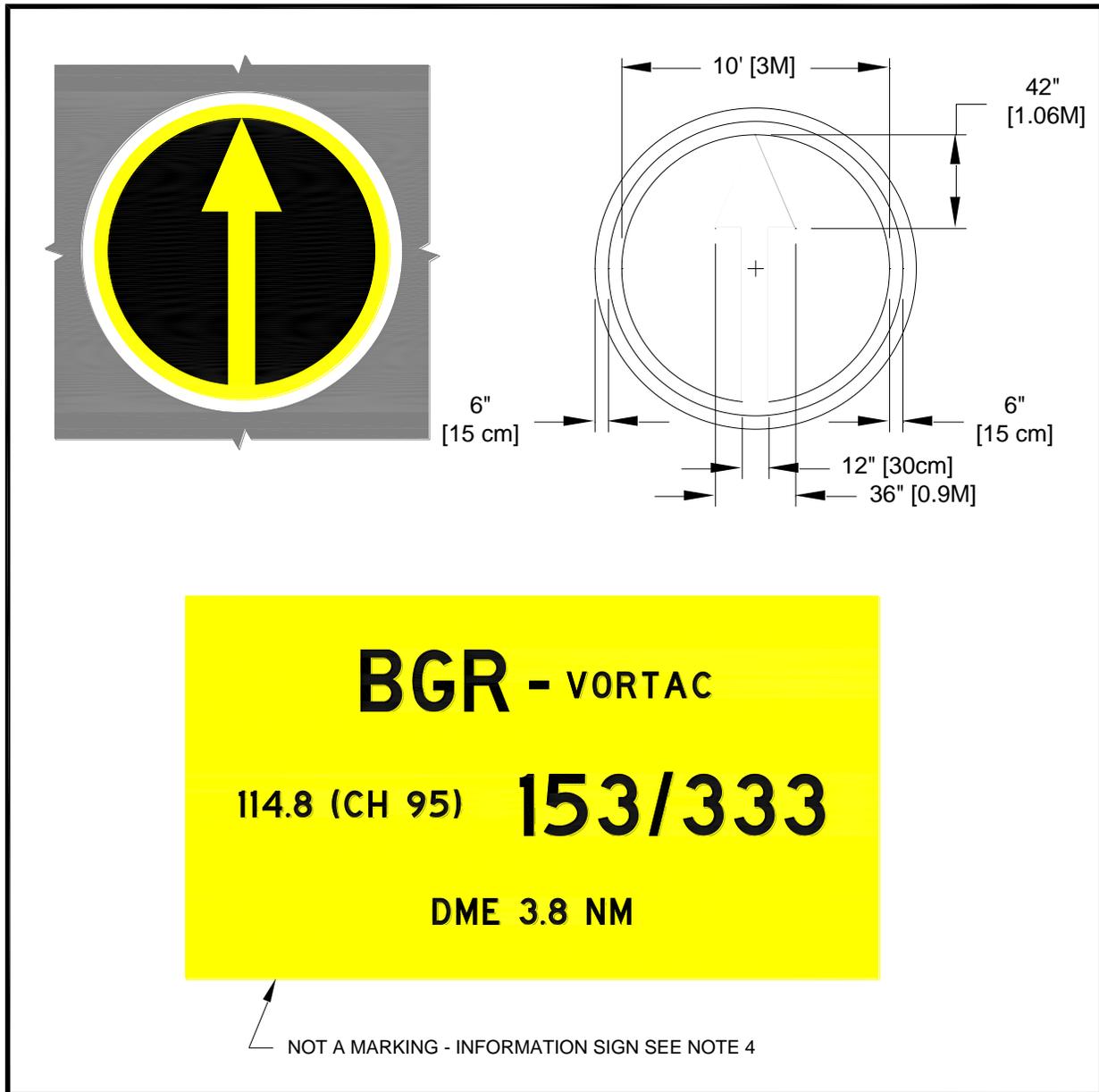


Figure A-24. Geographic position markings



Note: Refer to [Figure A-15](#).

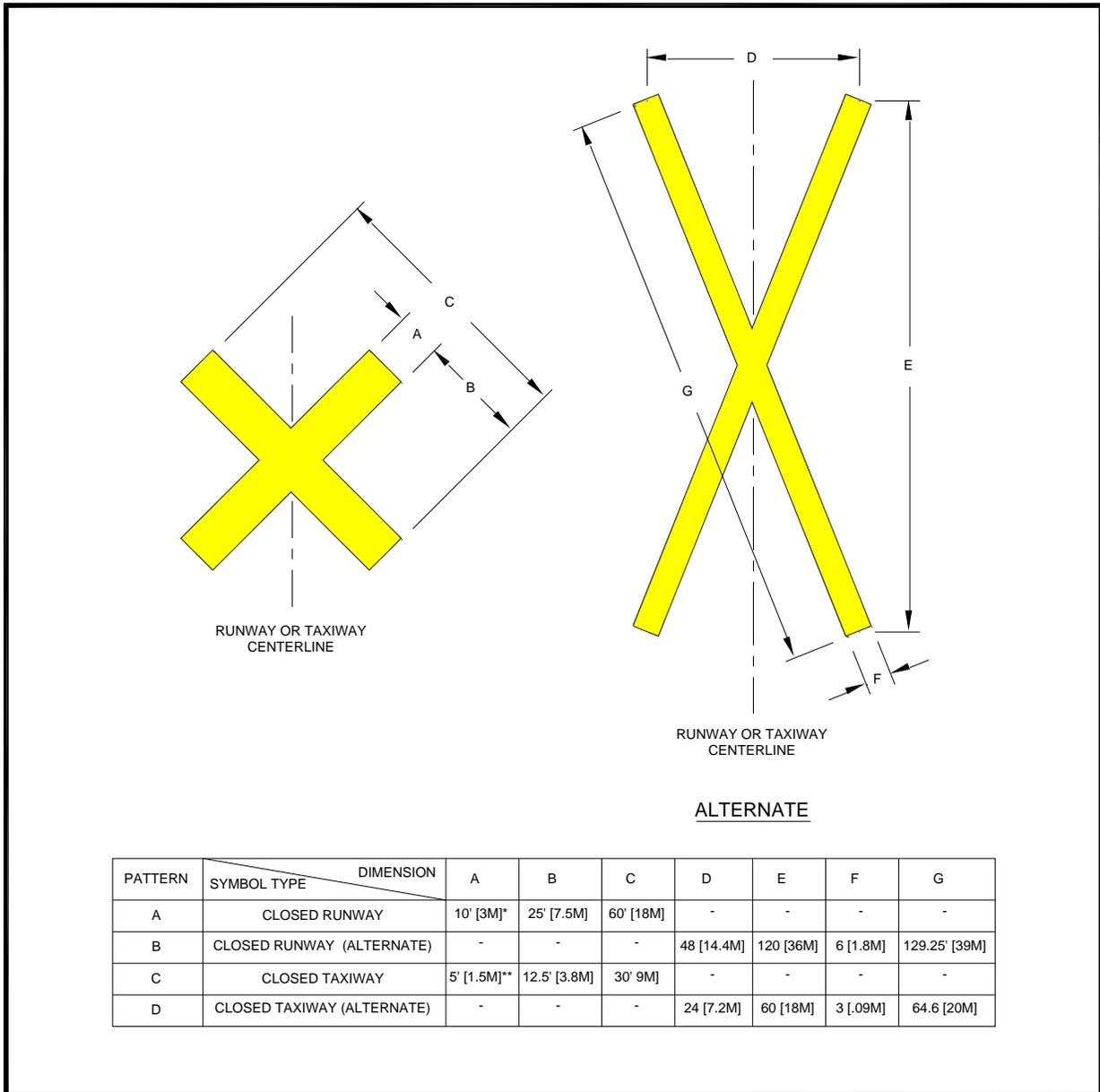
Figure A-25. Vehicle roadway markings



Notes:

1. Arrow is to be aligned toward the facility.
2. Interior of circle is to be painted black on concrete surfaces only.
3. Circle may be bordered on inside and outside with a 6 inches (15 cm) black band if necessary for contrast.
4. Refer to [AC 150/5340-18](#).

Figure A-26. VOR receiver checkpoint markings



Note: Both symbols are always painted yellow.
 * For temporary symbol, this dimension may be changed to 8 ft (2.4m).
 ** For temporary symbol, this dimension may be changed to 4 ft (1.2m).

Figure A-27. Closed runway and taxiway markings

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Appendix B. Inscriptions for Signs and Geographic Position Markings

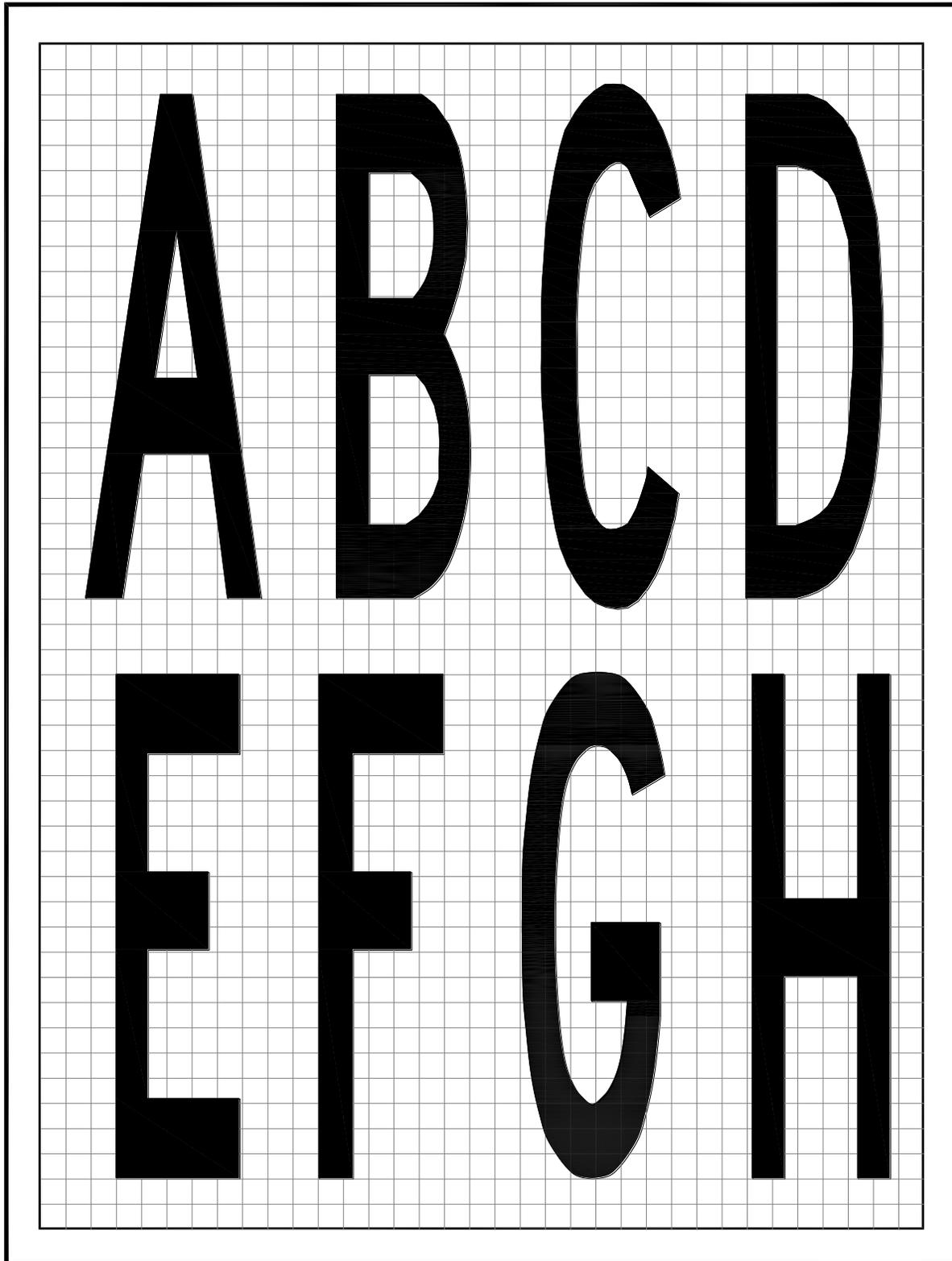


Figure B-1. Pavement markings ABCDEFGH

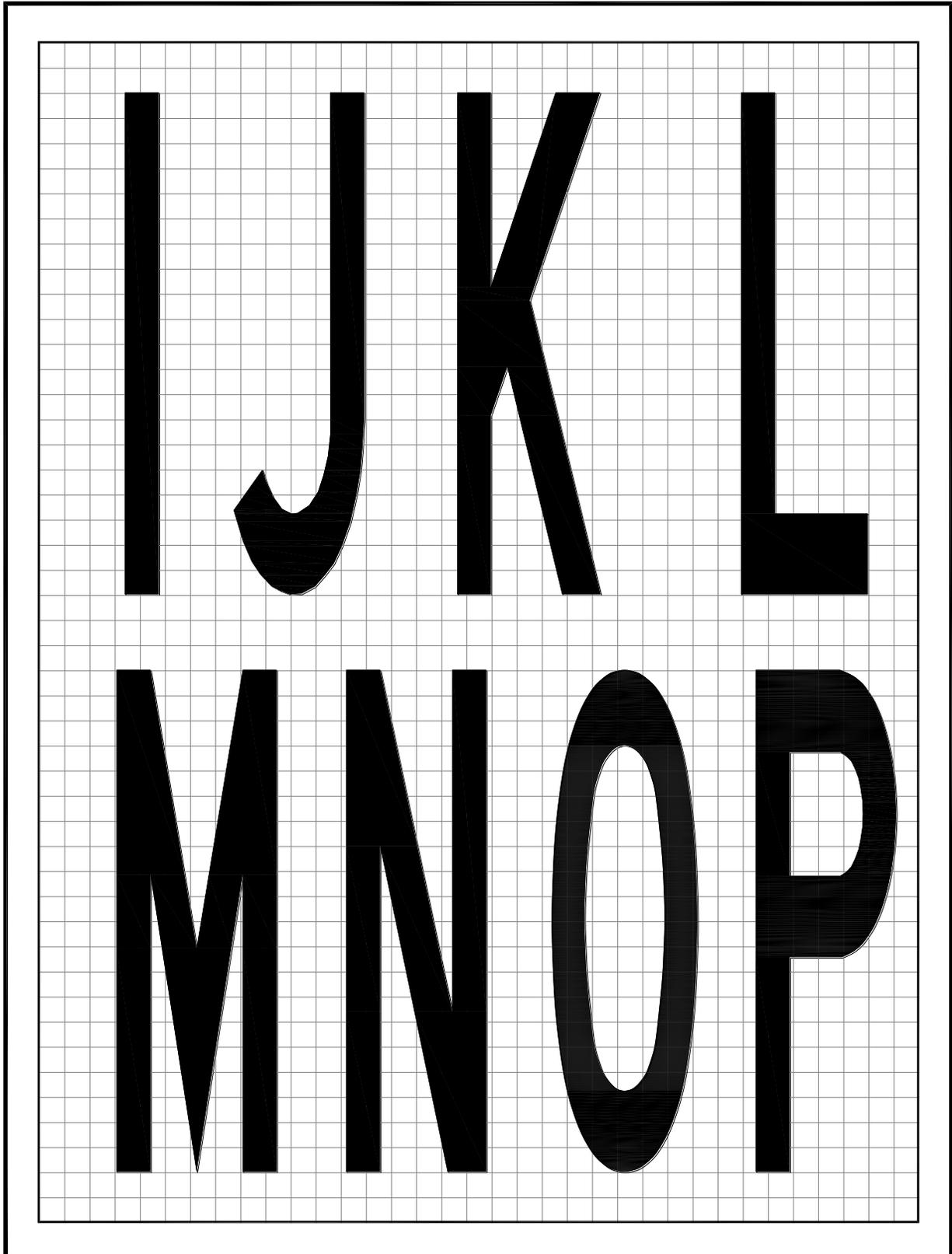


Figure B-2. Pavement markings IJKLMNPO

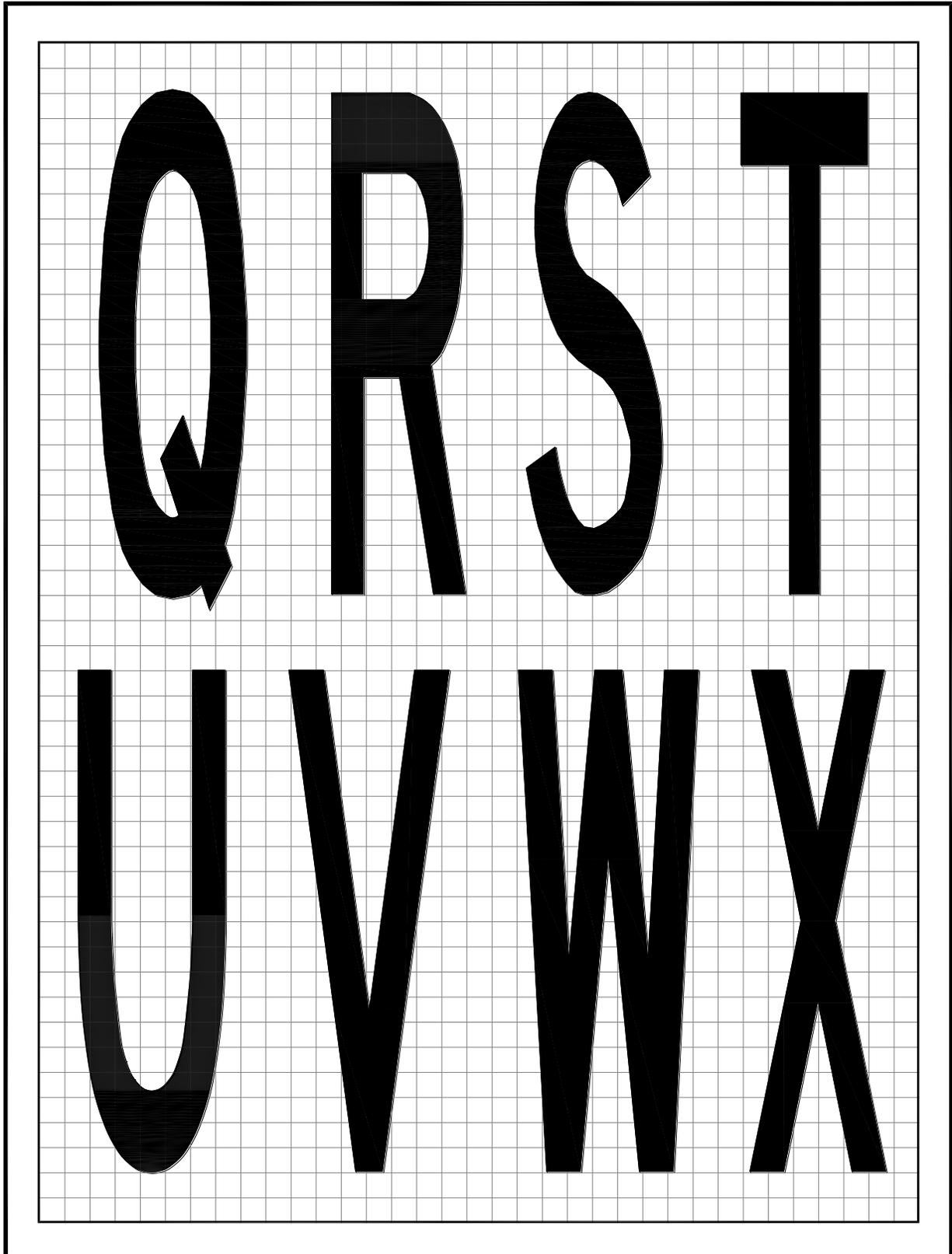


Figure B-3. Pavement markings QRSTUVWX

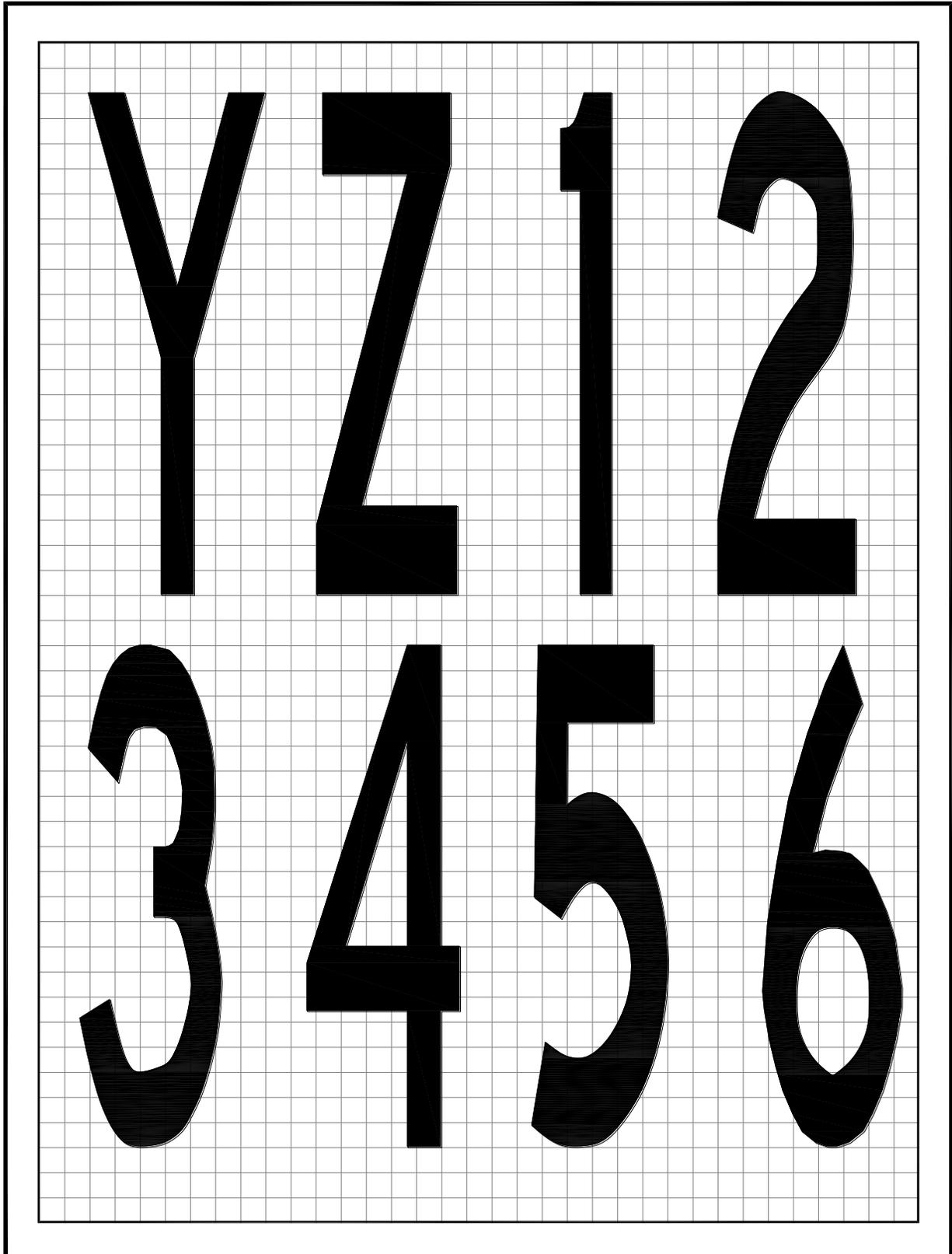


Figure B-4. Pavement markings YZ123456

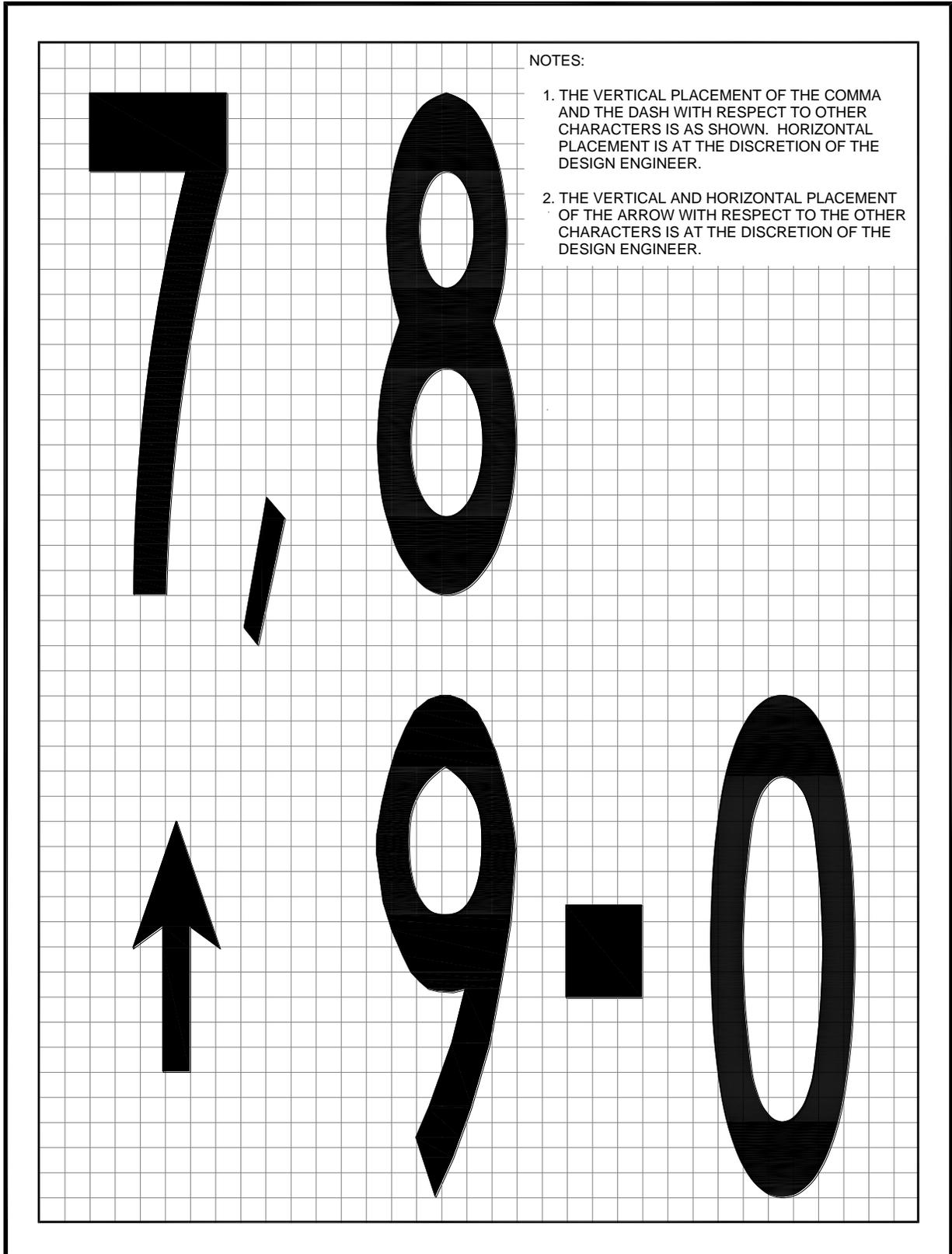


Figure B-5. Pavement markings 7890-,↑

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Appendix C. Examples of Markings Outlined in Black

This appendix illustrates the acceptable layout for various markings outlined in black. The black paint extends at least 6 inches (15 cm) beyond the outside edge of the markings. All spaces between paint lines in markings composed of two or more lines or dashes are painted in black as illustrated in the figures below. An alternate outlining pattern is provided for dashed taxiway edge line markings. These figures are not drawn to scale.

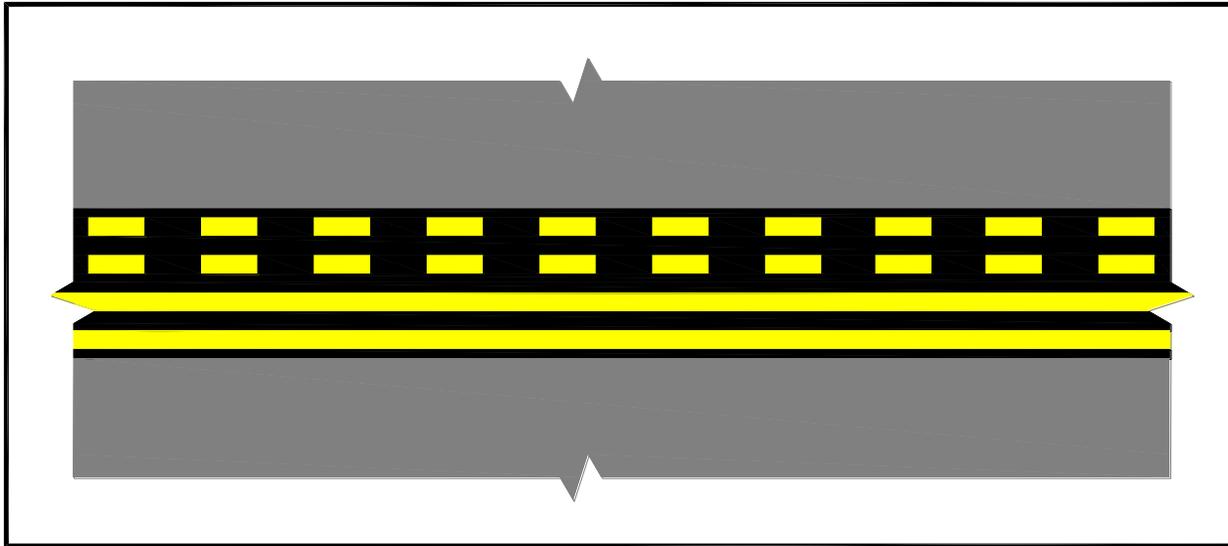


Figure C-1. Runway holding position marking

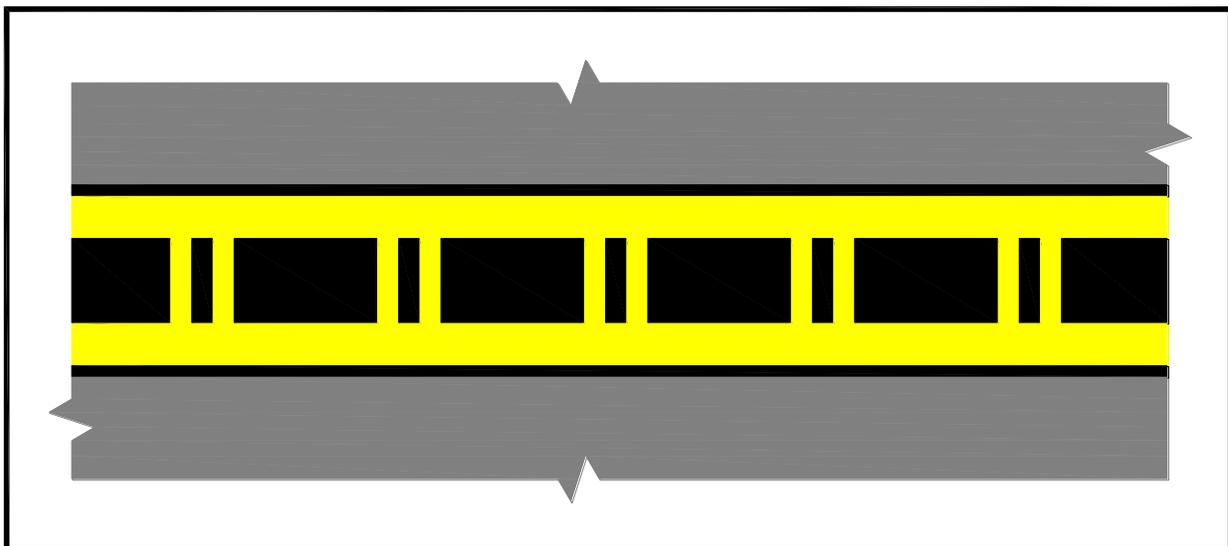


Figure C-2. ILS/MLS holding position marking

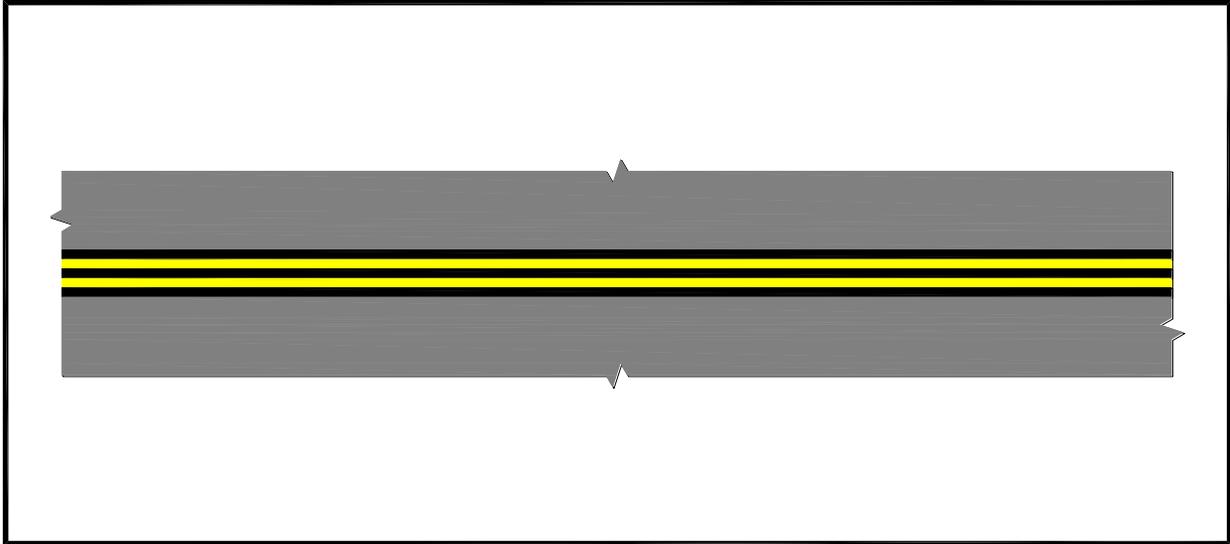


Figure C-3. Continuous taxiway edge line marking

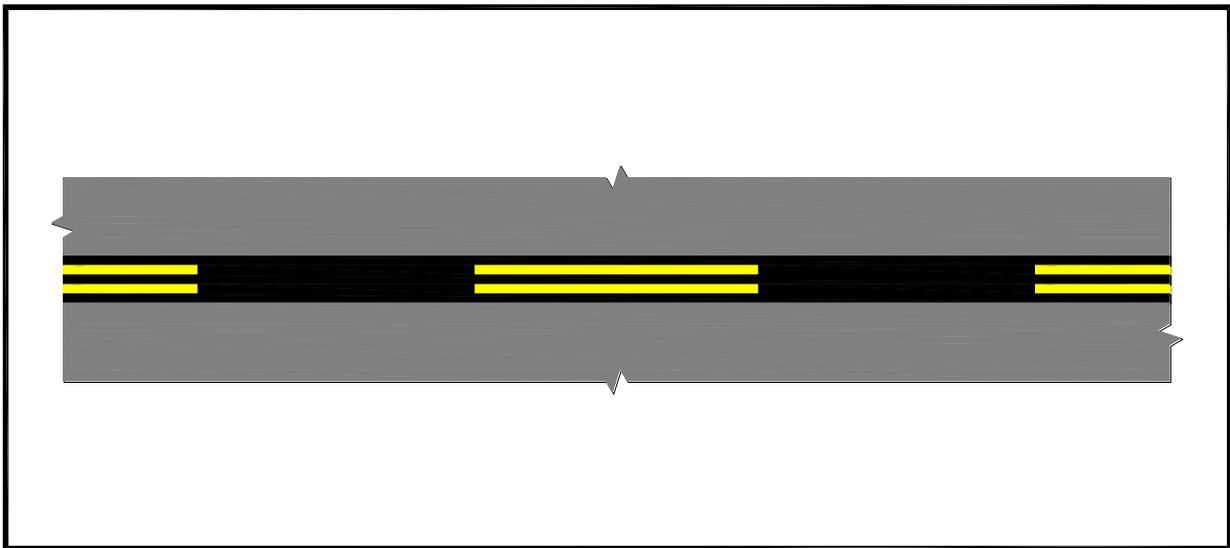


Figure C-4. Dashed taxiway edge line marking

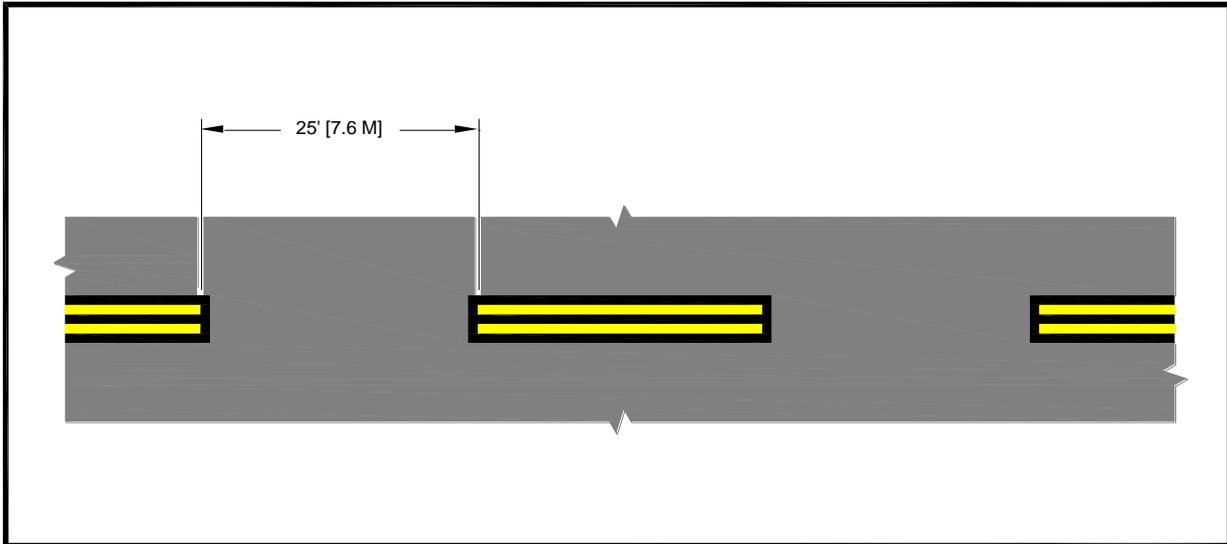


Figure C-5. Alternate outlining method for dashed taxiway edge line marking

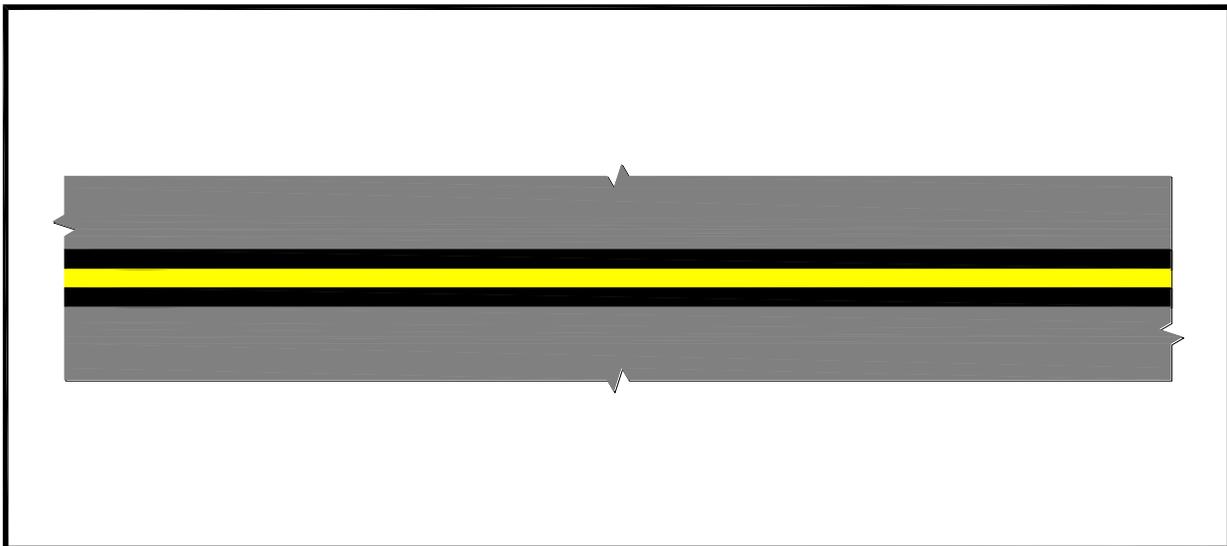


Figure C-6. Taxiway centerline marking

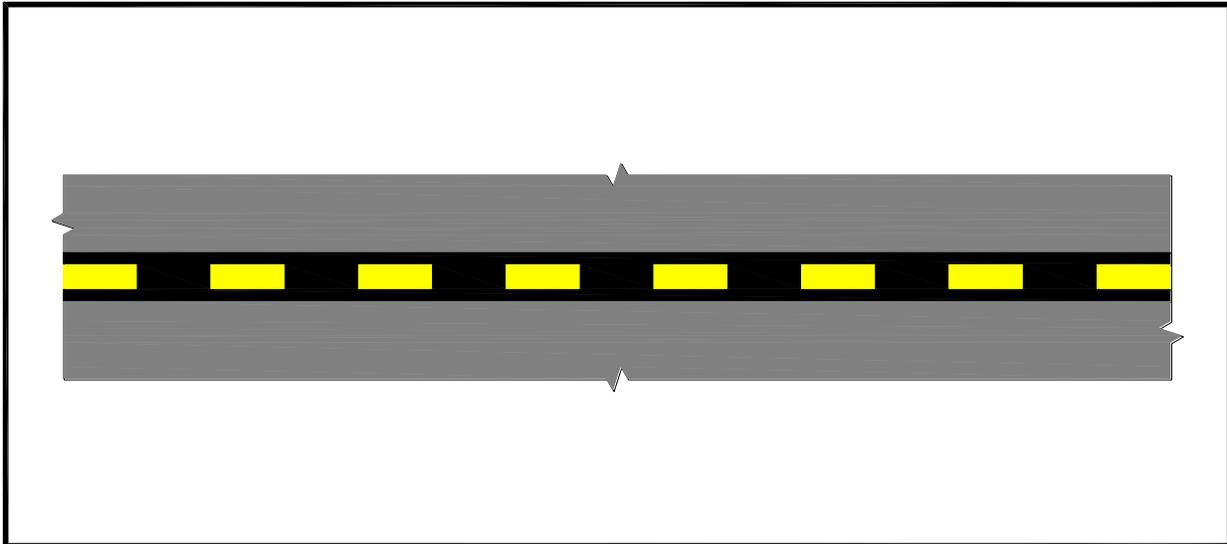


Figure C-7. Intermediate holding position markings

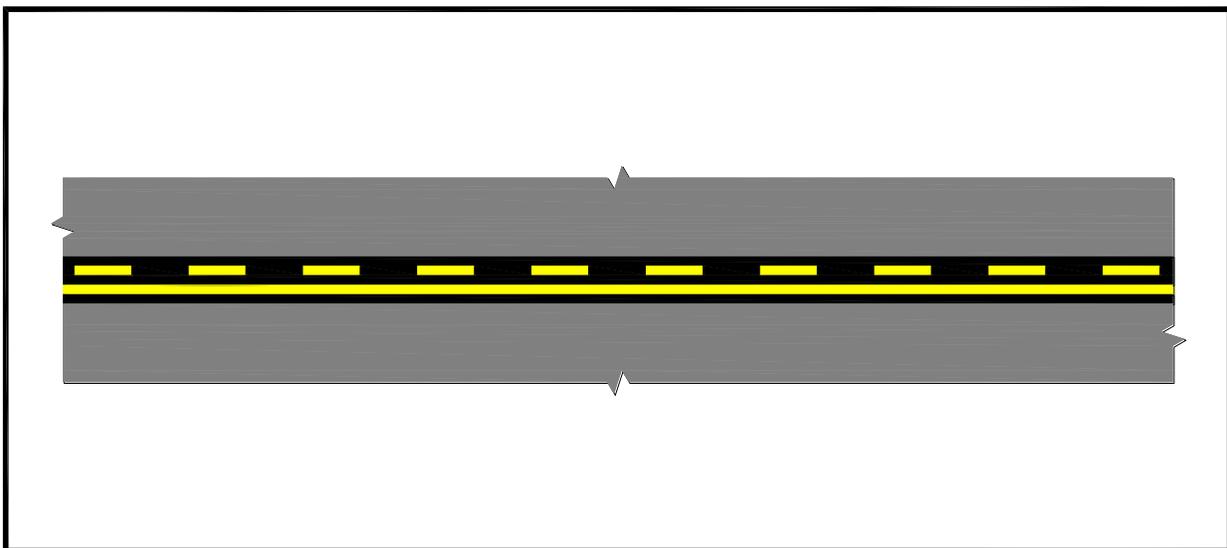


Figure C-8. Non-movement area boundary marking

Appendix D. Enhanced Markings for Runway Holding Position

D-1. General.

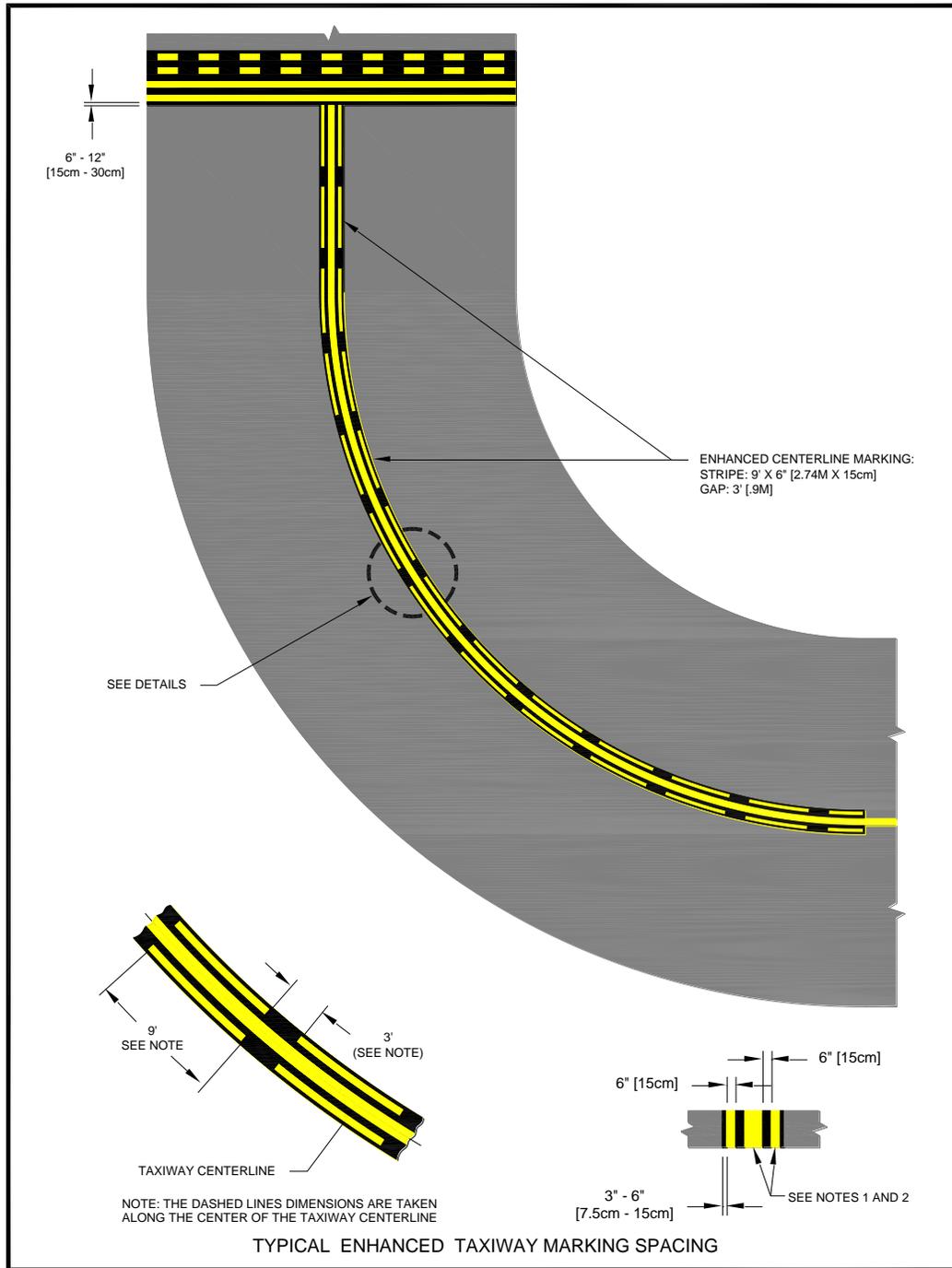
Enhanced taxiway markings are intended to provide additional visual cues to taxiing pilots to help them identify the location of the runway holding position. This appendix provides standards for these enhanced markings and guidance, including examples, on where to use the enhanced markings.

The figures included in this appendix are not drawn to scale.

D-2. Applicability.

The guidelines and standards for enhanced taxiway markings contained in this appendix may be used as a runway incursion prevention initiative. They may be used in combination or separately with existing taxiway markings. However, all intersections at an airport must use the same combination of markings.

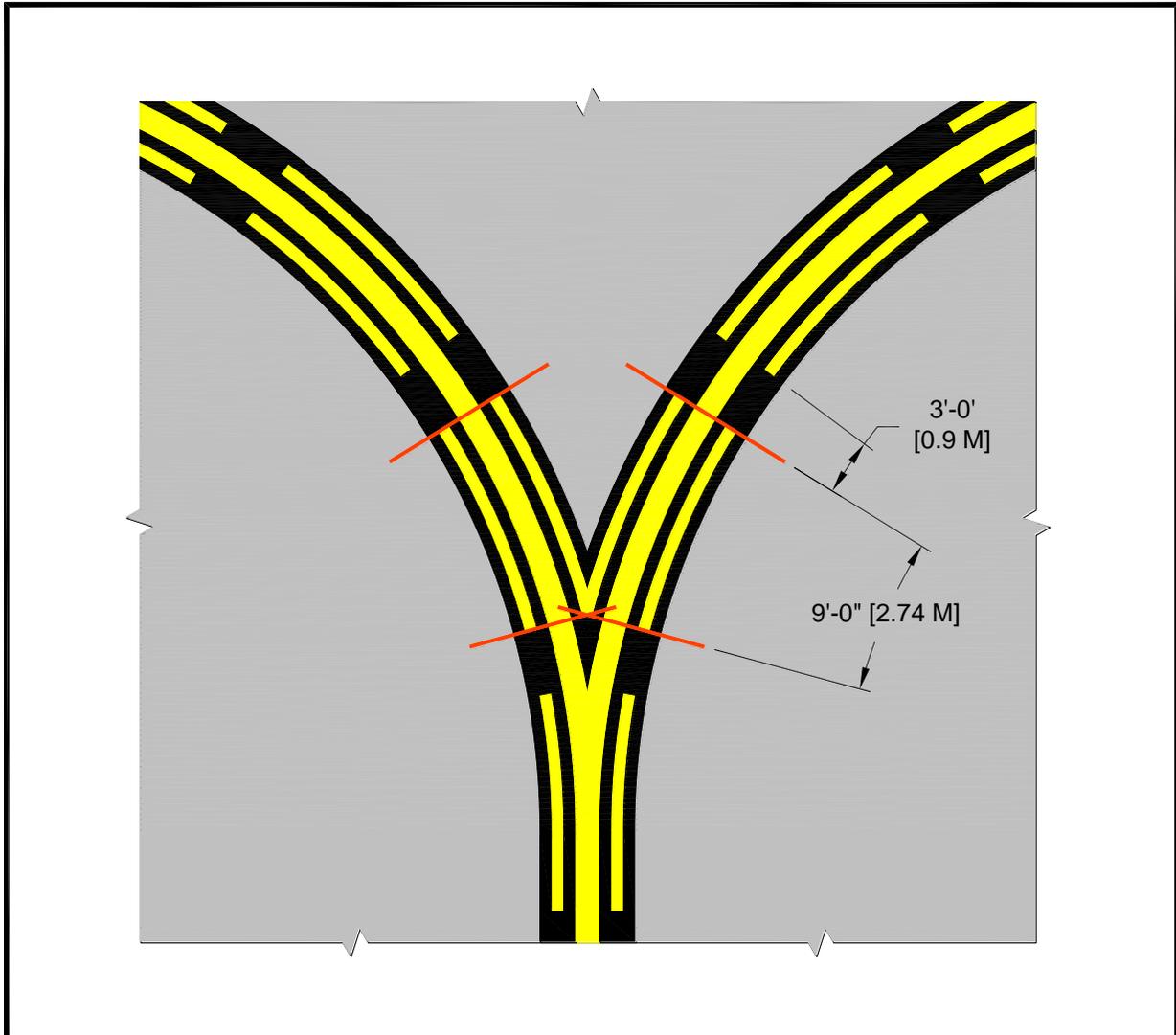
D-3. Enhanced taxiway centerline markings.



Notes:

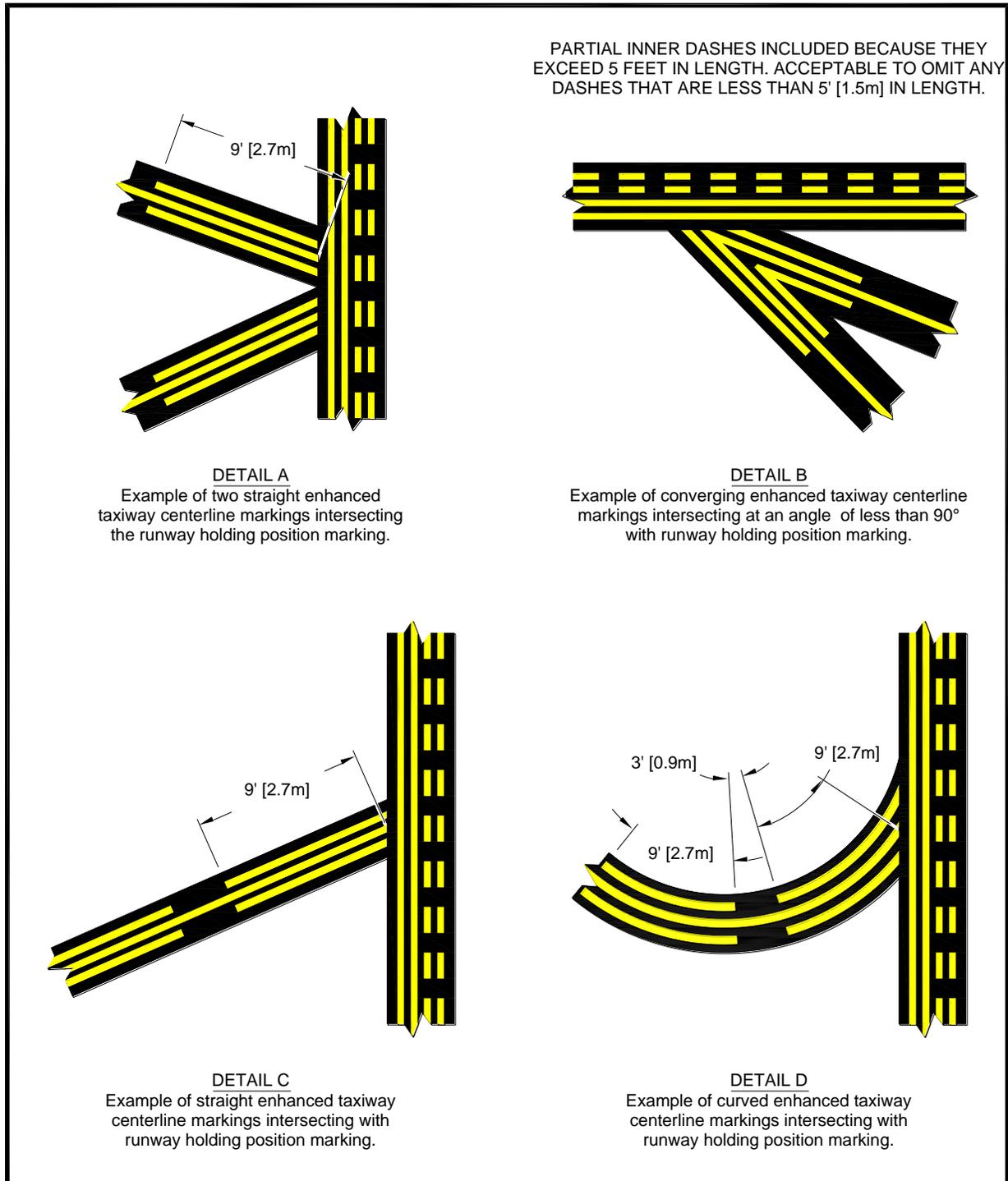
1. Dashed lines for the enhanced taxiway centerline marking are 6 inches (15cm) in width and separated 6 inches (15 cm) from the taxiway centerline. This applies to both 6 inches (15 cm) and 12 inches (30 cm) taxiway centerline markings.
2. The taxiway centerline markings may be shifted left or right to avoid interference with the taxiway centerline lights.

Figure D-1. Enhanced taxiway centerline markings

**Notes:**

1. As shown in this case the V-shaped inner dashes start and stop with the outside 9-foot (3 m) dashes. - However, this may not always be the case for the inner dashes. If the v-shaped are less than 5 feet (1.5 m) they may be omitted.
2. Measurements are taken along the center of the centerline stripe.

Figure D-2. Dashed lines at converging taxiway centerlines



Note: All measurements are taken along the center of the centerline.

Figure D-3. Converging, straight, and curved enhanced taxiway centerlines intersecting with holding position marking

D-4. Enhanced runway holding position markings.

The enhanced runway holding position marking, applicable only to those taxiway entrances that serve Airplane Design Group (ADG) V or VI airplanes, measures 125 feet (38 m) from one paved shoulder to the other paved shoulder, i.e., 62.5 feet (19 m) from the main taxiway centerline. Figure D-4 illustrates the enhanced surface marking on a standard 75-foot (23-m) wide taxiway with a standard 35-foot (10.5-m) wide taxiway shoulder for TDG-6. For taxiways wider than 75 feet (22.9 m) that connect to the runways that serve ADG V or VI aircraft, the holding position line is extended so it is 25 feet (7.5 m) on both paved taxiway shoulders.

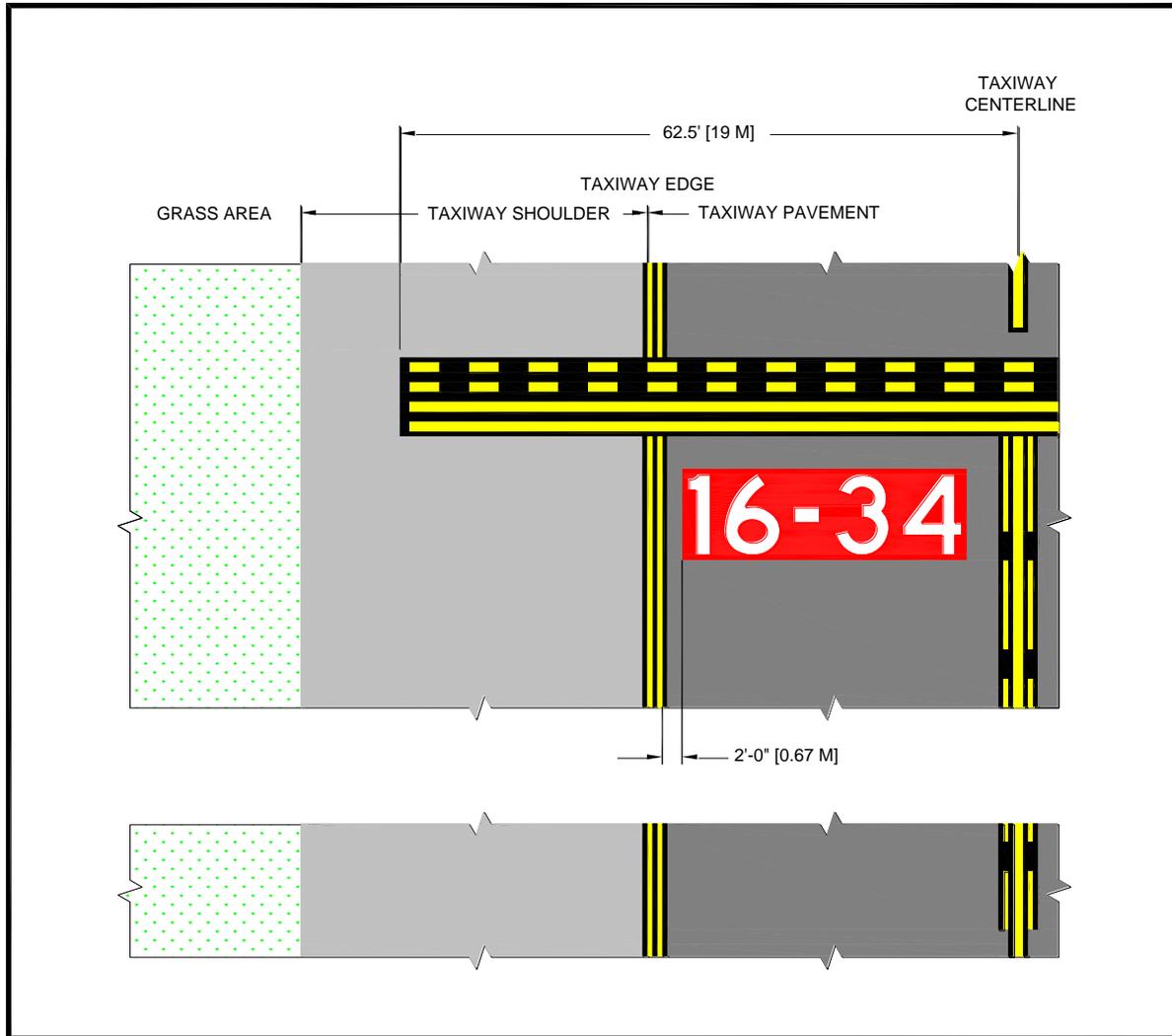


Figure D-4. Enhanced runway holding position markings on taxiways

D-5. Surface painted holding position signs.

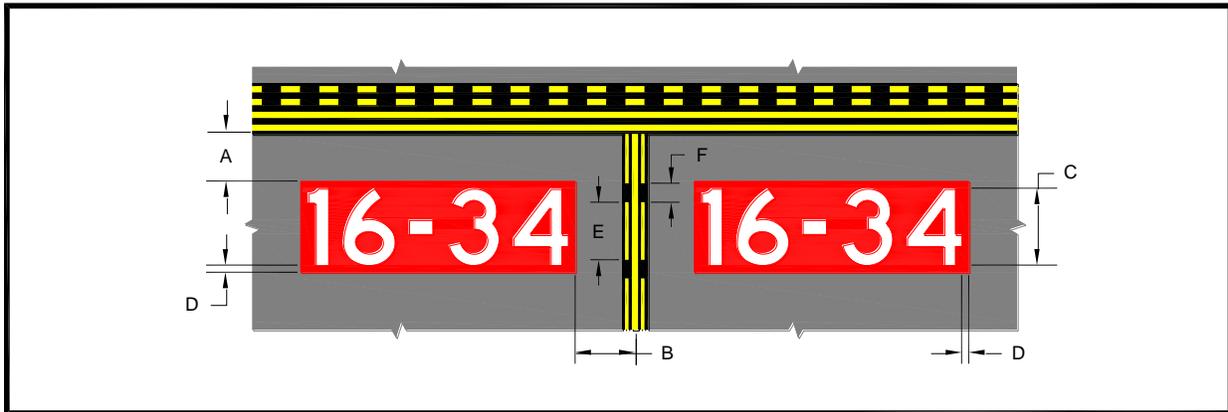


Figure D-5. Surface painted holding position signs for taxiway widths greater than 35 feet (10.5 m)

Table D-1.

Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 3.0)	
C	9 – 12 (2.75 – 3.7)	Inscriptions must have a height of 12 feet (3.7 m); however, the height may be reduced, as necessary, to the minimum height of 9 feet (2.75 m). In special situations, the surface painted marking may be reduced to less than 9 feet (2.75 m) in order to fit the marking appropriately. Examples of special situations include taxiways with widths narrower than 75 feet (22.9 m) or taxiways that need to display multiple runway designations with arrows. In all cases, inscriptions follow <u>Appendix B</u> inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 12 foot (3.7 m) height dimension. For practicality, the lowest height reduction is 6 feet (1.8 m). In all cases, the dimension D is not reduced.
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	

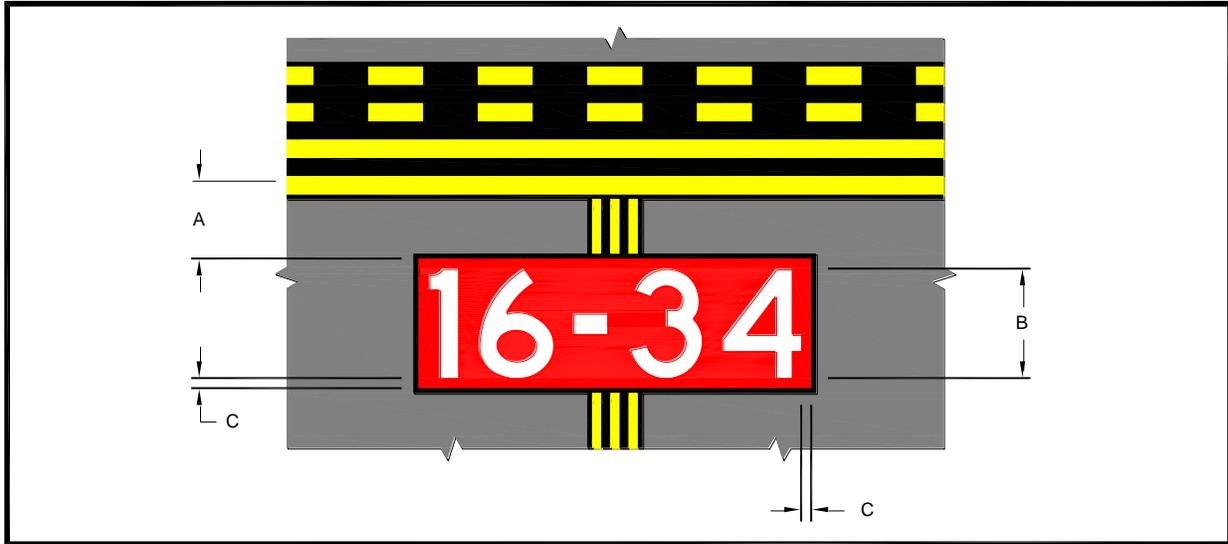


Figure D-6. Surface painted holding position sign for taxiway widths equal to or less than 35 feet (10.5 m)

Table D-2.

Dimension Letter	Dimension feet (meters)	Notes
A	2 – 3 (0.67 – 0.91)	
B	6 (1.8)	<p>Inscriptions follow Appendix B inscription criteria. The size of the sign inscription is scaled to fit taxiways 35 feet (10.5 m) or less in width for TDG-1A, TDG-1B, and TDG-2. Reference AC 150/5300-13.</p> <p>In special situations, the surface marking may be reduced to less than 6 feet (1.8 m) in order to fit the marking appropriately. Examples of special situations include taxiways that need to display multiple runway designations with arrows. In all cases, the inscriptions follow Appendix B inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 6-foot (1.8-m) height dimension.</p> <p>For practicality, the lowest height reduction is 3 feet (0.91 m).</p>
C	7.5 in (19 cm)	
NOTE		The dimensions for the enhanced taxiway centerline are in Figure D-1 . The spacing between the enhanced taxiway centerline and the surface painted holding position sign is 6 -12 inches (15 – 30 cm) see Figure D-1 .

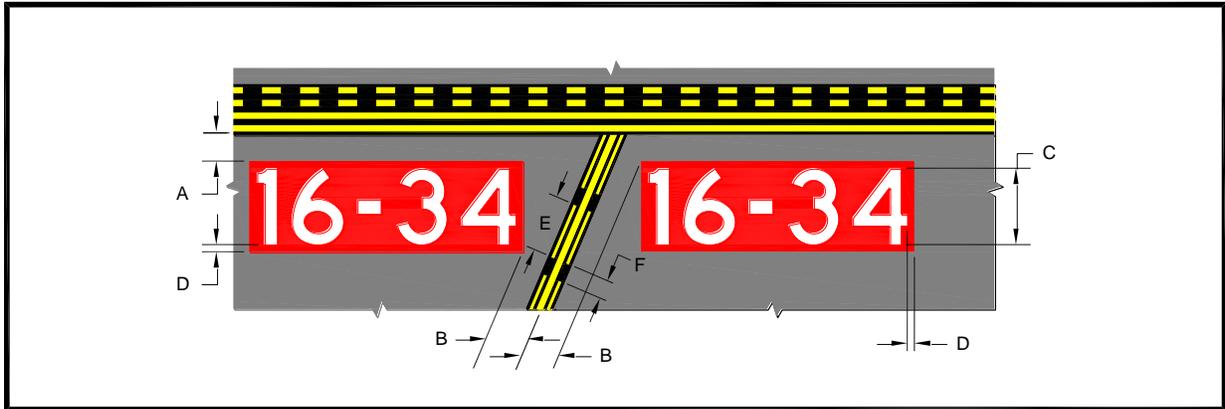


Figure D-7. Surface painted holding position signs when taxiway centerline is not perpendicular to runway holding position marking

Table D-3.

Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 3.0)	
C	9 – 12 (2.75 – 3.7)	Inscriptions must have a height of 12 feet (3.7 m); however, the height may be reduced, as necessary, to the minimum height of 9 feet (2.75 m). In special situations, the surface painted marking may be reduced to less than 9 feet (2.75 m) in order to fit the marking appropriately. Examples of special situations include taxiways with widths narrower than 75 feet (22.9 m) or taxiways that need to display multiple runway designations with arrows. In all cases, inscriptions follow Appendix B inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 12-foot (3.7-m) height dimension. For practicality, the lowest height reduction is 6 feet (1.8 m). In all cases, the dimension D is not reduced.
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	

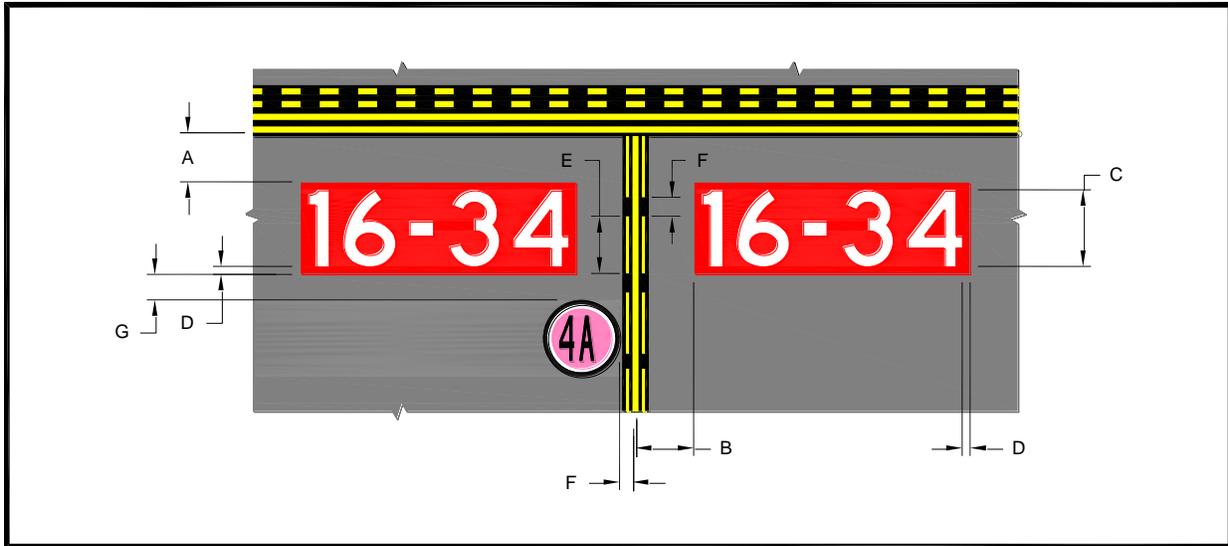


Figure D-8. Surface painted holding position signs co-located with geographic position marking

Table D-4.

Dimension Letter	Dimension feet (meters)	Notes
A	2 – 4 (0.67 – 1.34)	
B	3 – 10 (0.91 – 3.0)	
C	9 – 12 (2.75 – 3.7)	Inscriptions must have a height of 12 feet (3.7 m); however, the height may be reduced, as necessary, to the minimum height of 9 feet (2.75 m). In special situations, the surface painted marking may be reduced to less than 9 feet (2.75 m) in order to fit the marking appropriately. Examples include taxiways with widths narrower than 75 feet (22.9 m) or taxiways that need to display multiple runway designations with arrows. In all cases, the inscriptions follow <u>Appendix B</u> inscription criteria. All other taxiway entrances to the same runway not needing the reduction are to maintain the 12-foot (3.7-m) height dimension. For practicality, the lowest height reduction is 6 feet (1.8 m). In all cases, the dimension D is not reduced.
D	15 inches (38 cm)	
E	9 (2.75)	
F	3 (0.91)	
G	4 (1.3)	From edge of red border
H	2 (0.65)	From outermost edge of main yellow taxiway centerline

Note: Because the geographic position marking cannot be located at a runway holding position for the low-visibility runway (see paragraph 4.11), this figure applies only where the designated taxi route for low-visibility operations crosses a runway that is not itself the low-visibility runway.

D-6. Additional guidelines for application.

The following illustrations provide examples of various runway holding position locations using the enhanced markings. The figures included in this appendix are not drawn to scale.

- a.** Two Taxiway Centerlines Converging at a Runway Holding Position Marking.
Where two taxiway centerlines converge at a runway holding position marking, the surface painted holding position signs must be installed parallel to the runway holding position marking. As shown in Figure D-9, only one sign on either side of the two taxiway centerlines is practical.

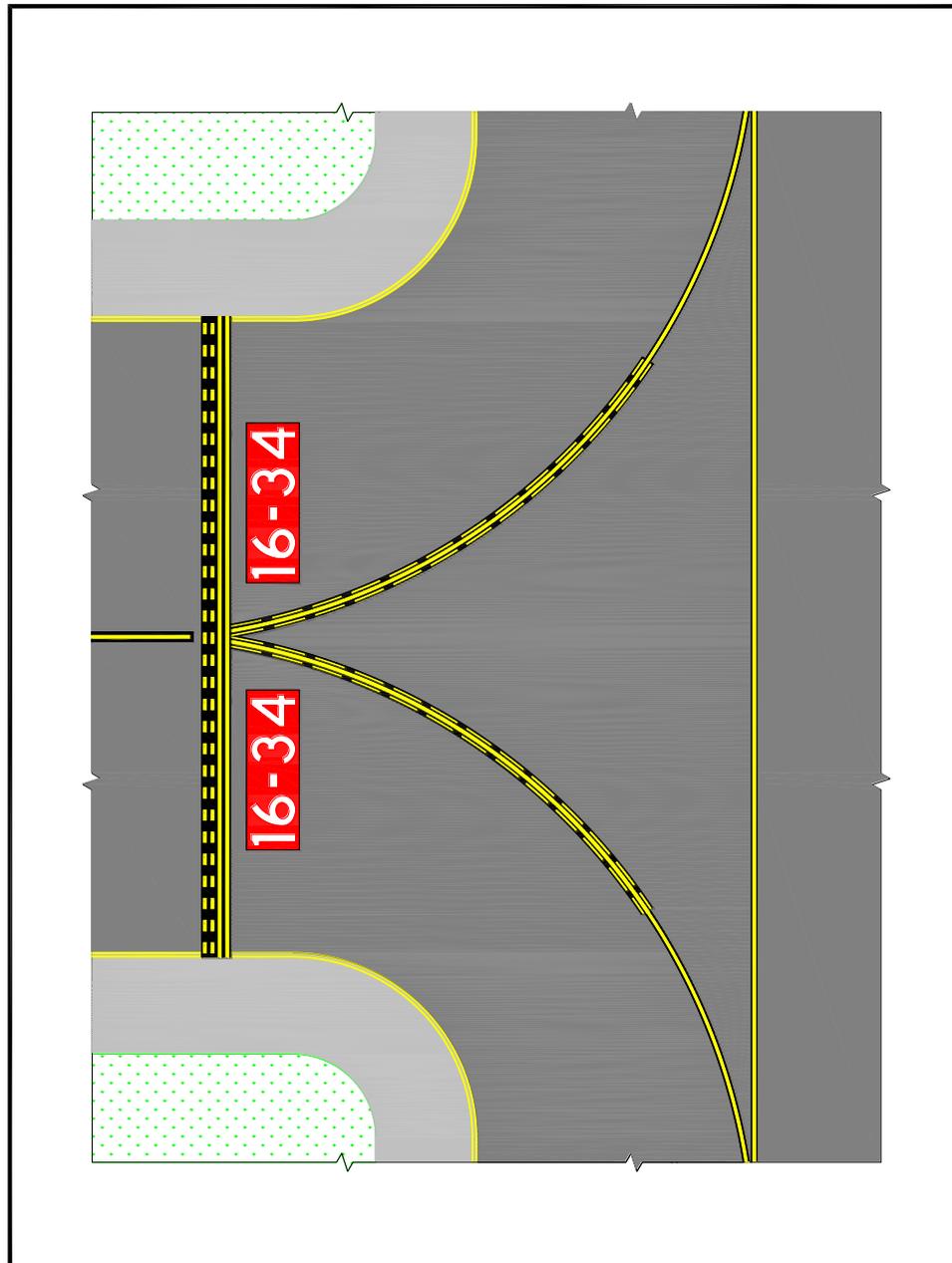


Figure D-9. Two taxiway centerlines converging at a runway holding position marking

b. Intersection of Two Taxiways at Runway End. In the case of two converging taxiway centerlines, surface painted holding position signs containing a single runway designator must be positioned parallel to the runway holding position marking, as shown in Figure D-10.

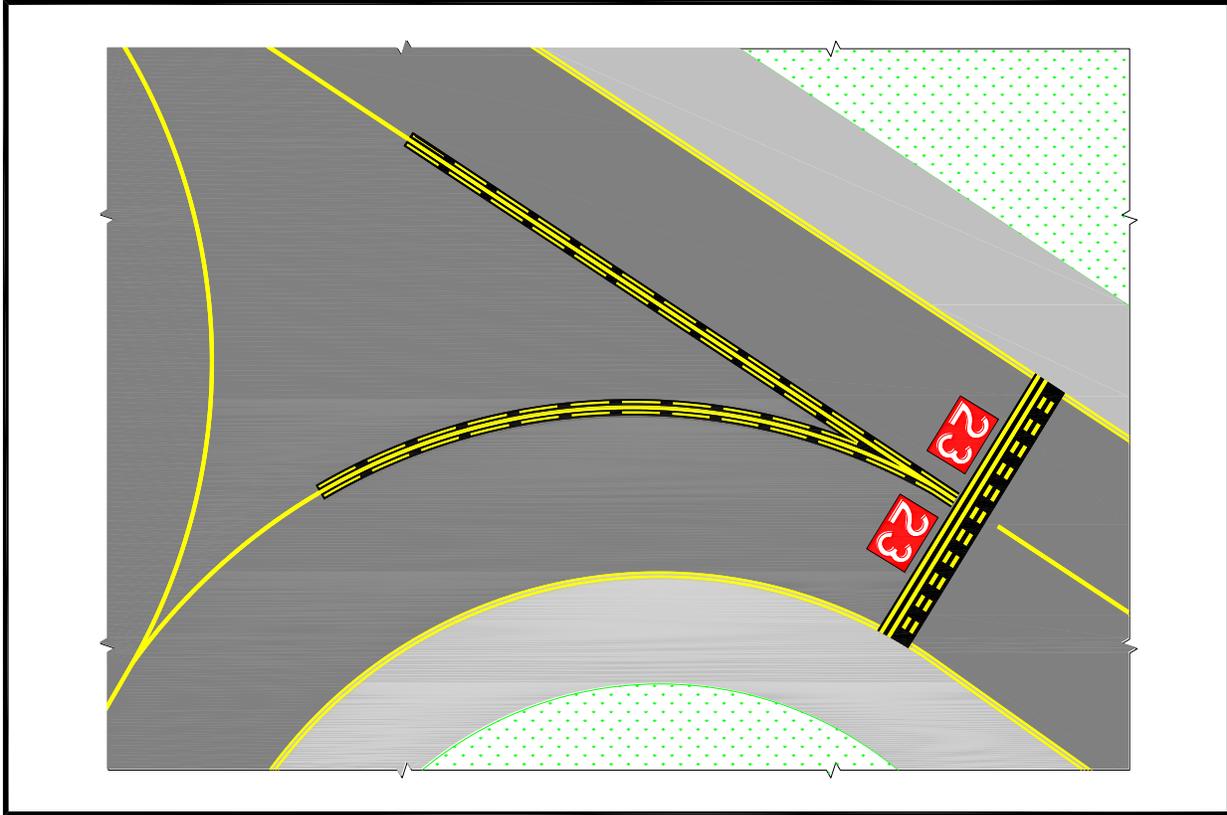
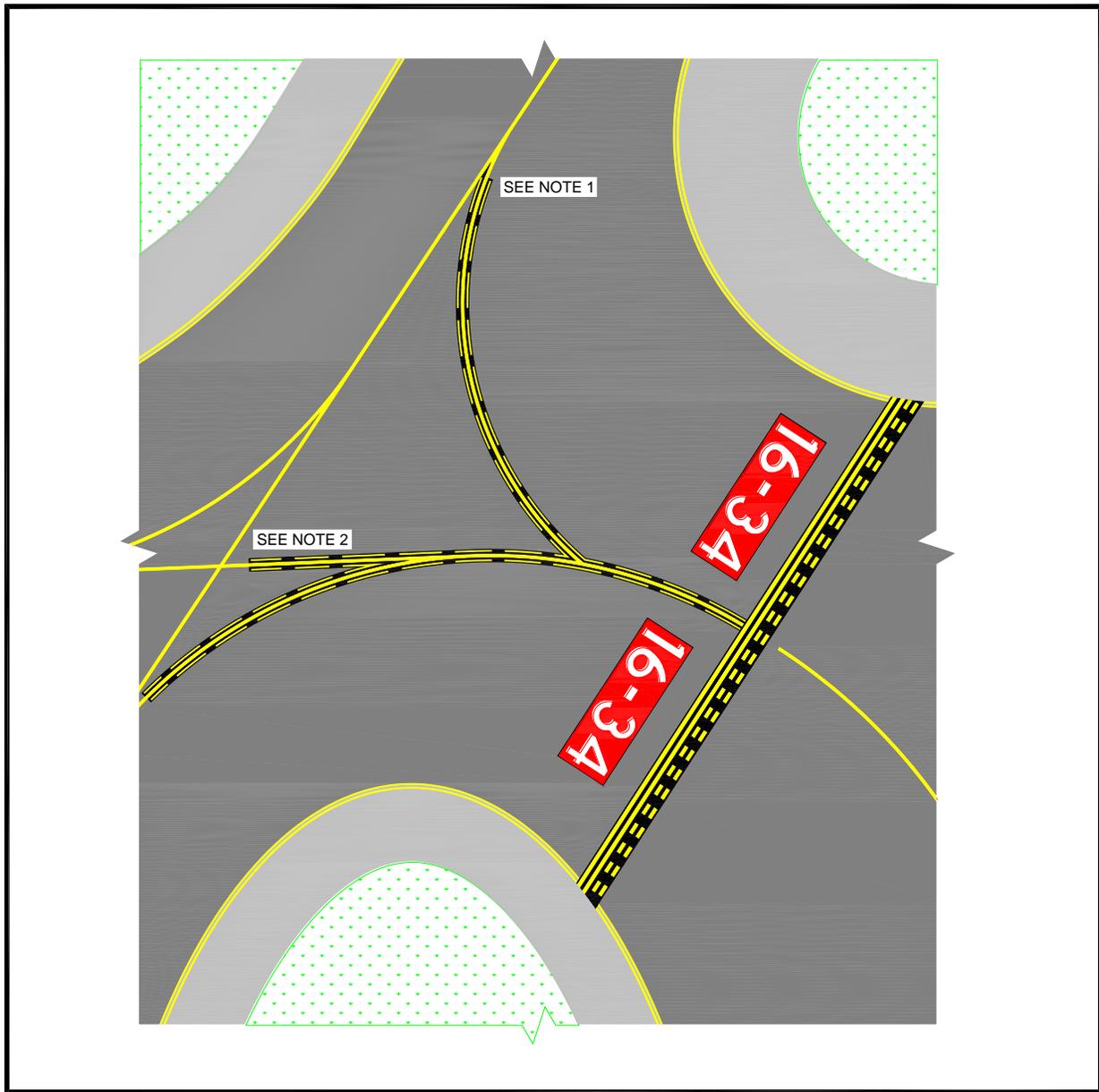


Figure D-10. Intersection of two taxiways at runway end

c. Intersection of Three Converging Taxiway Centerlines. Figure D-11 illustrates taxiway centerline configurations when there are three converging centerlines.

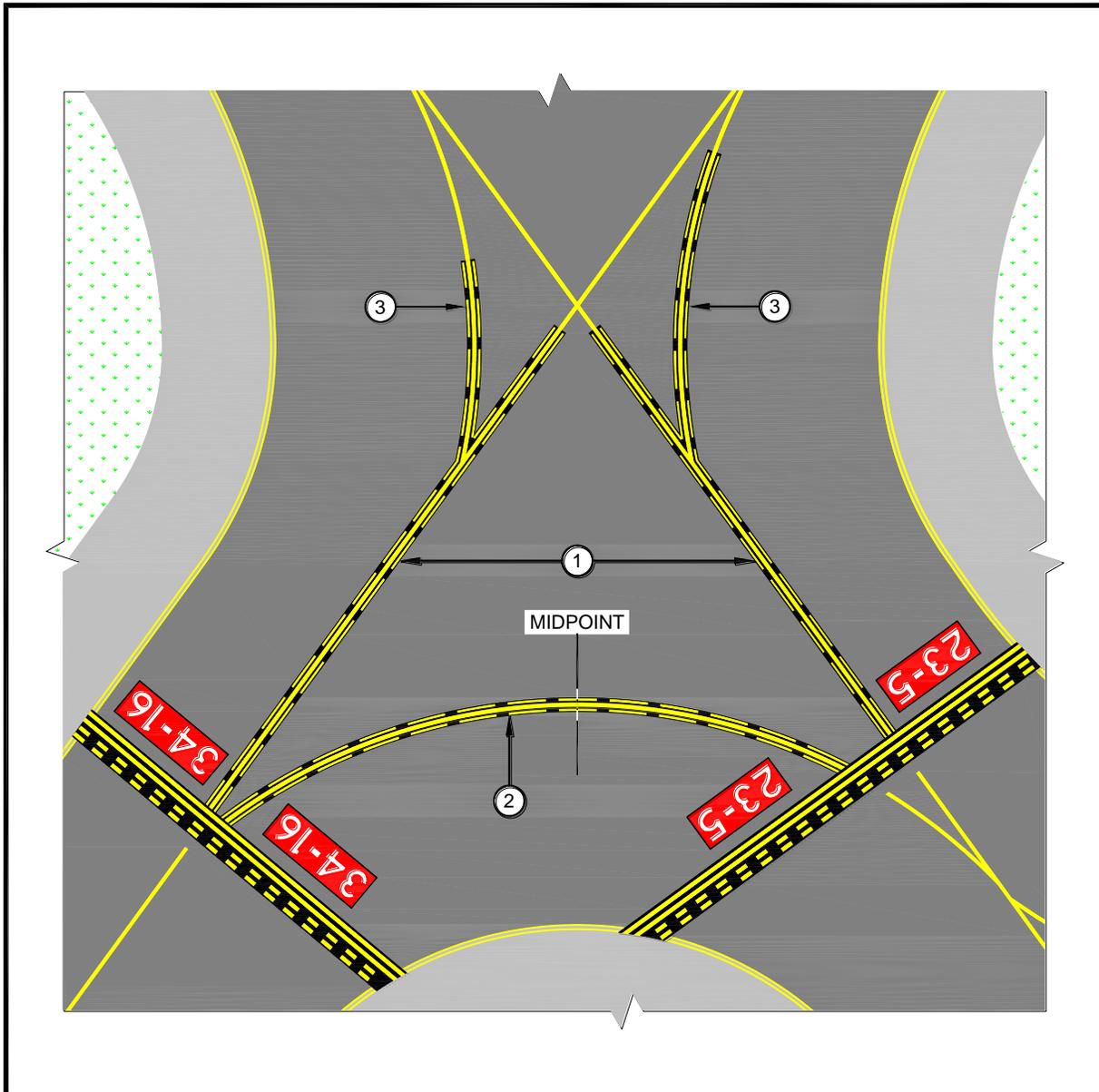


Notes:

1. Enhancement is tangent to merging curve.
2. Enhancement terminates 5 feet (1.5 m) from intersection.

Figure D-11. Intersection of three converging taxiway centerlines

d. Intersection of Multi-Taxiway Centerlines with Less than 150 Feet (45.7 m) Between Taxiways. Figure D-12 illustrates different taxiway centerline configurations when there are three converging centerlines, less than 150 feet (45.7 m) between the runway holding position markings, and potential difficulty in positioning surface painted holding position signs in the available space.



Notes:

1. Illustrates perpendicular taxiway centerlines less than 150 feet (45.7 m) (see paragraph 4.3.d).
2. Illustrates a curved taxiway centerline between two runway holding position markings with less than 150 feet (45.7 m) along the taxiway centerline (see paragraph 4.3.d).
3. Illustrates a converging taxiway centerline curving toward two runway holding positions.

Figure D-12. Intersection of multi-taxiway centerlines with less than 150 feet (45.7 m) between taxiways

e. Two Taxiway Centerlines Intersecting a Runway Holding Position Marking.
Figure D-13 illustrates an angled runway holding position marking that is intersected by two taxiway centerlines.

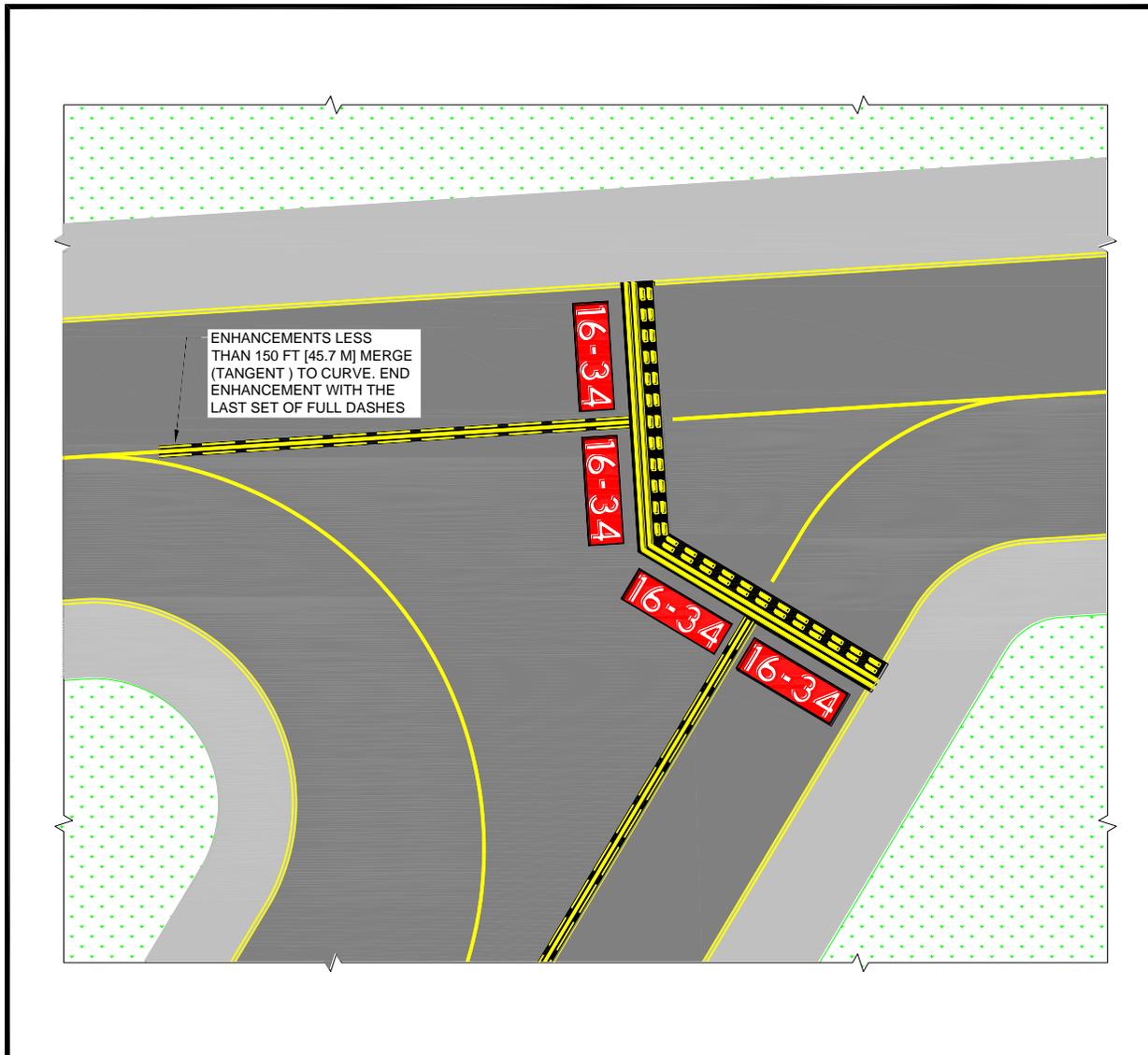


Figure D-13. Two taxiway centerlines intersecting a runway holding position marking

f. Intersection of Stub Taxiway and Runway. Figure D-14 illustrates a solution for a stub taxiway that is less than 150 feet (45.7 m) long, with a 90-degree turn and angled taxiway shoulder areas. Per paragraph 4.3.d, the enhancement terminates 5 feet (1.5 m) from a taxiway/taxiway intersection.

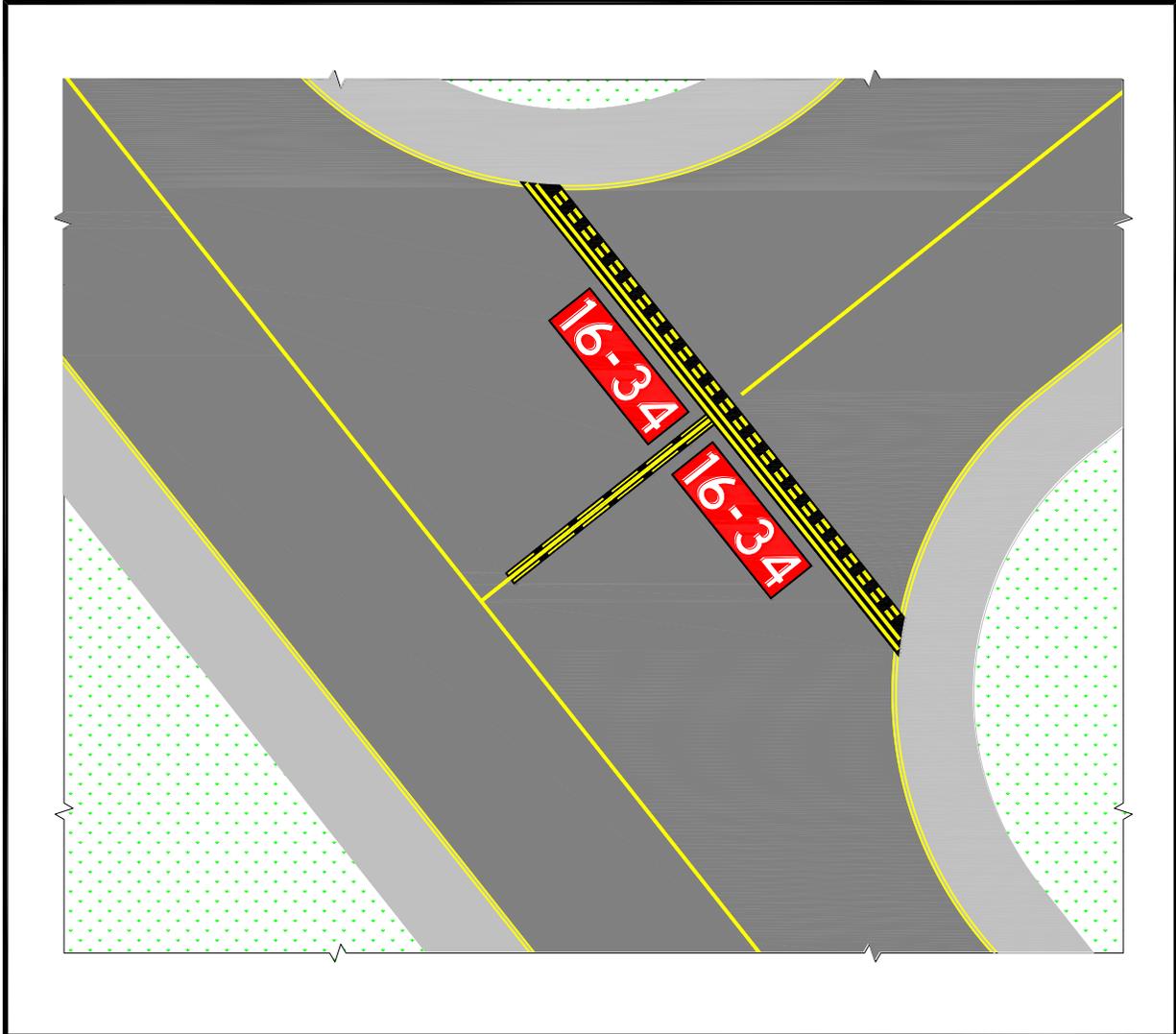
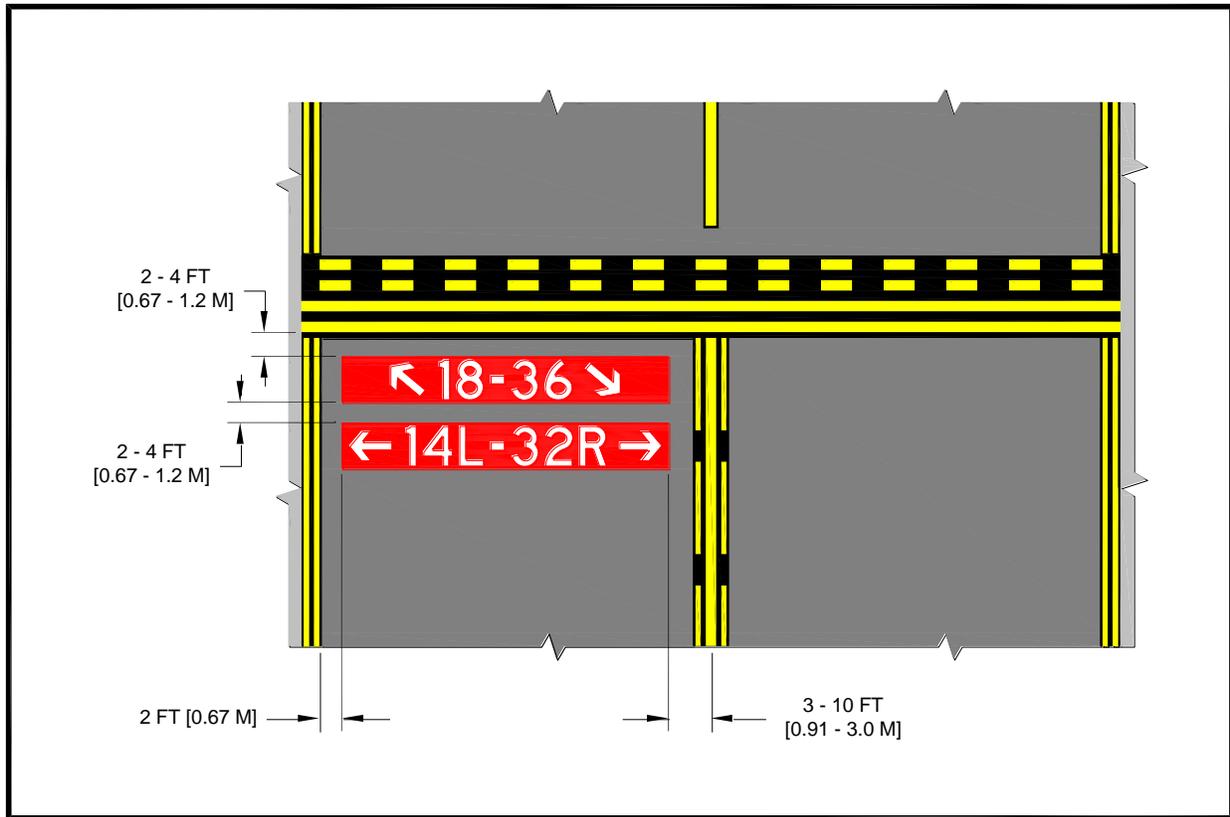


Figure D-14. Intersection of stub taxiway and runway



Notes:

1. Stacked surface painted holding position signs for narrow taxiways - only to be used per paragraph 4.5.d(1)(ii).
2. The recommended order of appearance follows:
 - a. If the “stacked” surface painted holding position signs are for a taxiway that clearly accesses one runway (for example, RWY 14L-32R) before another runway (RWY 18-36), then the order of appearance is from “bottom up” as shown above.
 - b. If the “stacked” surface painted holding position signs are for a taxiway that equally offers access to two or more runways, then follow a “clockwise” order of appearance as viewed for the holding position. Hence, the bottom surface painted holding position sign is the first runway as viewed from the holding position. This practice follows the signage convention.
3. For taxiways less than or equal to 35’ wide, the stacked surface painted holding position signs are located centered on the taxiway in accordance with Figure D-6.

Figure D-15. Narrow taxiway stacked surface painted holding position sign

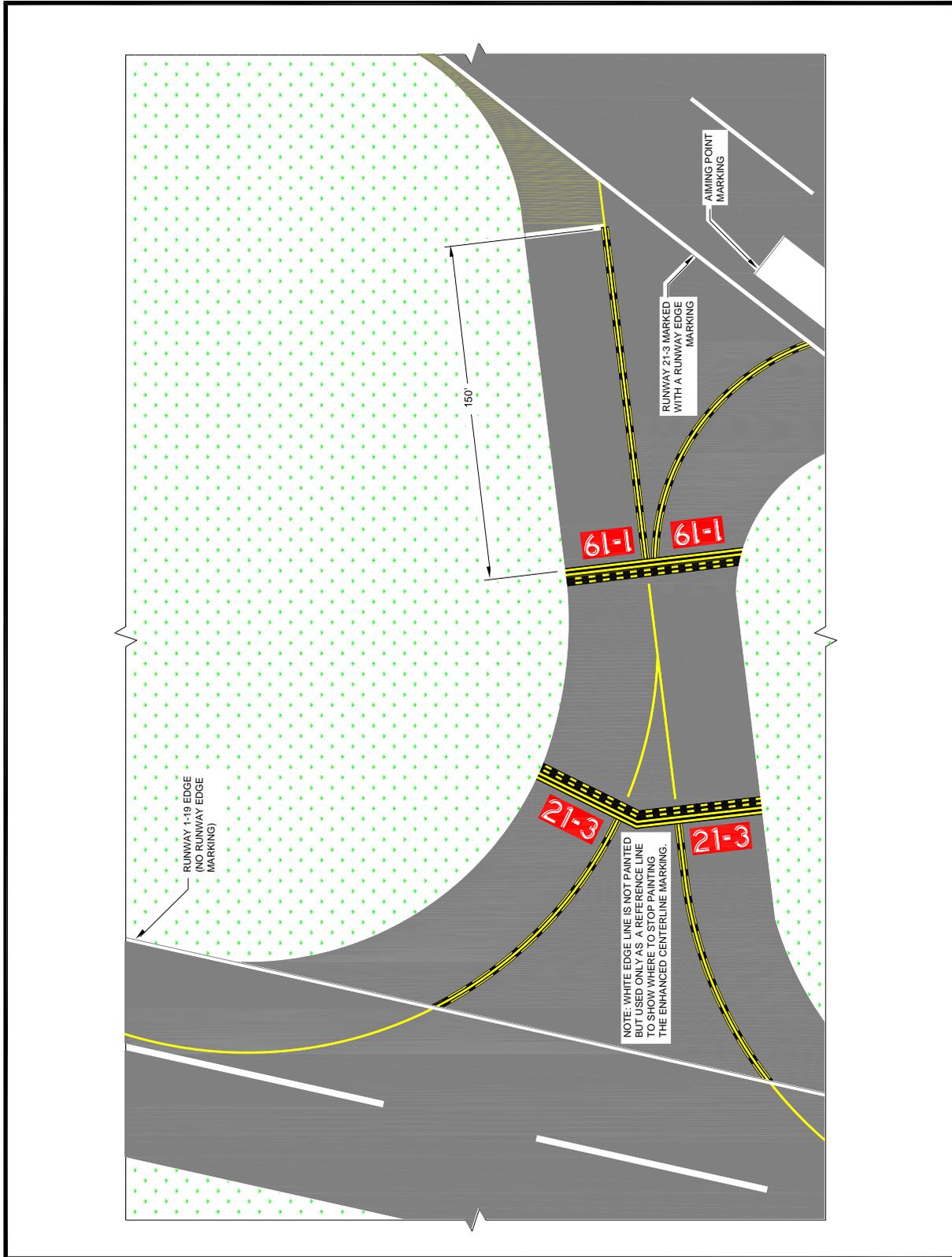


Figure D-16. Enhanced taxiway centerlines when a taxiway connects closely spaced runways

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