CITY CLERK
ORIGINAL

CONTRACT SET

C-8122
08/14/2012

PROJECT SPECIFICATIONS AND CONTRACT DOCUMENTS

PROJECT 0910005

GLENDALE MUNICIPAL AIRPORT
RUNWAY SAFETY IMPROVEMENTS

AIP No. 3-04-0064-20
ADOT No. E1F27

JUNE 2012

GLENDALE

Registered Professional Engineer (Civil)
CERTIFICATE NO.
43308
JESSICA L.
MULLEN
Date Signed 6-5-12
ARIZONA, U.S.A.
Expires: 9-30-13

CITY OF GLENDALE

ENGINEERING DEPARTMENT
5850 W. Glendale Avenue, Glendale, Arizona 85301 (623) 930-3630

GLENDALE

Engineering Department

Memorandum

DATE: June 29, 2012
TO: All Plan and Specification Holders
FROM: Engineering
SUBJECT: PROJECT NO. 091005 – GLENDALE MUNICIPAL AIRPORT RUNWAY SAFETY IMPROVEMENTS PROJECT

ADDENDUM NO. 1

In accordance with the contract documents "Information for Bidders," Page 5, Paragraph 12 CHANGES TO PLANS AND DOCUMENTS, the following revisions to the plans and specifications shall become a part of the contract documents and the bidder shall acknowledge receipt thereof as directed in Paragraph 13 of the Information for Bidders.

PLEASE SEE ATTACHED

THIS ADDENDUM CONSISTS OF THE _5_ PAGES INCLUDING THE COVER PAGE

Registered Professional Engineer (Civil)
CERTIFICATE NO.
33442
LANCE R.
McINTOSH
Date Signed 6/29/12
ARIZONA, U.S.A.

Expires 3/31/14

ADDENDUM NO. 1

GLENDALE MUNICIPAL AIRPORT
RUNWAY SAFETY IMPROVEMENTS
FAA AIP No. 3-04-0064-020
ADOT NO. E1F27
CITY OF GLENDALE PROJECT NO. 0910005

In accordance with the Information for Bidders, page 5, paragraph 13 of the Contract Documents, the following revisions to the Plans and Specifications shall become a part of the Contract Documents and each bidder shall acknowledge receipt thereof on page182 of the Bid Schedule.

GENERAL

ITEM 1: Page A-4 of this addendum contains the Glendale Municipal Airport Disadvantaged Business Enterprise (DBE) Program Policy Statement.

ITEM 2: Below are the Meeting Minutes from the Pre-bid Meeting dated June 26, 2012.

PRE-BID MEETING MINUTES
June 26, 2012 at 9:00 AM
GLENDALE MUNICIPAL AIRPORT
RUNWAY SAFETY IMPROVEMENTS
FAA AIP No. 3-04-0064-020
ADOT NO. E1F27
CITY OF GLENDALE PROJECT NO. 0910005

The content of this report is not a complete representation of the meeting minutes. Instead, it is a list of important information and clarifications pertaining to the project. If any corrections, comments, or additional items are necessary, please notify Lance McIntosh at C&S Engineers, Inc. 602-997-7536.

1. Introductions, Meeting Conductor: Lance McIntosh – C&S Companies

2. Meeting Attendance – See attached sheet

3. Scope of work: This project involves construction of asphalt blast pads at each end of the runway, construction of an asphalt dust cap, relocation of an existing blast deflector fence, ramp marking improvements and the relocation of an existing windcone. Miscellaneous electrical and fencing items are also included in this project.

4. Discussion of federal Requirements: Funding for this project is coming from the FAA, ADOT and the City of Glendale. Prevailing Wage and Salary Rates apply and all bidders must comply with all provisions of the Davis-Bacon Act and submit certified payrolls. The DBE goal is 10% and the EEO requirements are 19.6% Minority and 6.9% Female.

5. Operational Safety and Security at the Airport: Only the ramp marking portion of the project may be performed during daytime work hours. All other work shall be performed during nightly closures of the runway. All gates shall remain closed and locked unless a Contractor furnished gate guard is on duty.

6. Construction Phasing: The construction phasing is identified in the Construction Safety Plan, which each plan holder received as part of their bid package. The requirements for

barricading and emergency contact information are included in the Construction Safety Plan. The Contractor must comply with the Construction Safety Plan.

7. Proposal Form: Each bid item unit price and extension must be written in. Lance stated that bidders need to complete the entire proposal form as well as the other bid sheets in the specification book. All bids must be signed, addendums acknowledged, and list the Contractor's license number.

8. Assurances, Certifications and Other Bid Requirements: Bidders must completely fill out the Authorized Signature Form, List of Subcontractors, Statutory Bid Bond in the amount of 10%, Non-Collusion Affidavit, Certification of Nonsegregated Facilities, Previous Contracts Subject to the EEO Clause, Assurance of DBE Participation, Certification Regarding Debarment, etc., Certification Regarding Foreign Countries, Buy American Certificate, and the Certificate of Insurability.

9. Contractor Prequalification: All contractors must be prequalified. See FAA General Provisions, Subsection 2.

10. Award of Contract: The Award of the Contract will be to the lowest, responsive, qualified bidder whose proposal conforms to the requirements of the bid documents. Award of the project is contingent on the approval of the FAA and ADOT and receipt of funding from both agencies. It is anticipated that the project will be awarded soon after the bid opening, however, the City may hold the bids for 70 days.

11. Time Schedule and Liquidated Damages: 60 calendar days with liquidated damages at $500 per day.

12. Addendum Items: Lance stated that following this meeting an addendum will be issued. The Contractor must acknowledge receipt of all addenda's in his/her bid packet on the proposal form. The minutes from this meeting and attendance form will be included in the addendum.

13. Questions and discussion:
    - Construction water is available near the project site through the City of Glendale. The Contractor is responsible for obtaining a meter and paying the cost of any water used.
    - Excess excavation (if any) may remain on site and be placed and compacted at the location of the proposed relocated windcone.
    - The Contractor is responsible for construction surveying and layout.

14. Clarification Prior to Bid Opening: All questions must be submitted to C&S Companies in writing four working days prior to bid opening.

15. Bids are due on July 3, 2012 at 10:00 A.M. (AZ Time) at the Engineering Department of the City of Glendale.

C&S Engineers, Inc.
9200 E. Pima Center Pkwy.
Suite 240
Scottsdale, AZ 85258
P: (602) 997-7536
F: (602) 997-7592
www.cscos.com

City of Glendale
Runway Safety Area Improvements
Project 0910005
Pre-Bid Meeting
9:00 AM June 26th, 2012

MEETING ATTENDANCE

NAME	FIRM	PHONE NO	EMAIL
Brian Quintana	FCI Constructors, Inc.	[redacted]	bquintana@fciol.com
Kevin Smith	J. Banicki		ksmith@banicki.com
Aaron Jucchesi	Nesbitt Contracting		AaronL@Nesbitts.com
Jim Macinowski	SRS Paving + Construction		jim@sspaving.com
ERIC ROGERS	Sunland Asphalt		Erogers@Sunlandasphalt.com
WALT FIX	City of Glendale		wfix@glendaleaz.com
Bill Passmore	City of Glendale		bpassmore@glendaleaz.com
Lance McIntosh	C&S Companies		Lmcintosh@cscos.com

GLENDALE MUNICIPAL AIRPORT

DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

Policy Statement (§§26.1, 26.23)

The Glendale Municipal Airport has established a Disadvantaged Business Enterprise (DBE) Program in accordance with regulations of the U.S. Department of Transportation (DOT), 49 CFR Part 26. The Glendale Municipal Airport has received Federal financial assistance from the Department of Transportation, and as a condition of receiving this assistance, the Glendale Municipal Airport has signed an assurance that it will comply with 49 CFR Part 26.

It is the policy of the Glendale Municipal Airport to ensure that DBEs, as defined in part 26, have an equal opportunity to receive and participate in DOT-assisted contracts. It is also our policy to:

1. Ensure nondiscrimination in the award and administration of DOT assisted contracts;
2. Create a level playing field on which DBEs can compete fairly for DOT assisted contracts;
3. Ensure that the DBE Program is narrowly tailored in accordance with applicable law;
4. Ensure that only firms that fully meet 49 CFR Part 26 eligibility standards are permitted to participate as DBEs;
5. Help remove barriers to the participation of DBEs in DOT assisted contract;
6. Assist the development of firms that can compete successfully in the market place outside the DBE Program.
7. Provide appropriate flexibility to recipients of Federal financial assistance in establishing and providing opportunities for DBEs.

The Airport Administrator has been delegated as the DBE Liaison Officer. In that capacity, the Airport Administrator is responsible for implementing all aspects of the DBE program. Implementation of the DBE program is accorded the same priority as compliance with all other legal obligations incurred by the Glendale Municipal Airport in its financial assistance agreements with the Department of Transportation.

Glendale Municipal Airport has disseminated this policy statement to the Glendale Municipal Airport and all the components of our organization. We have distributed this statement to DBE and non-DBE business communities that perform work for us on DOT-assisted contracts by way of the Airport's website.

_____ _____

Jamsheed Mehta, Executive Director Transportation Services Date

PROJECT SPECIFICATIONS AND CONTRACT DOCUMENTS

MAYOR
Elaine M. Scruggs

COUNCIL MEMBERS
Norma S. Alvarez
Joyce V. Clark
Steven E. Frate
Yvonne J. Knaack
H. Philip Lieberman
Manuel D. Martinez

CITY MANAGER
Ed Beasley

CITY CLERK
Pamela Hanna

CITY ATTORNEY
Craig D. Tindall

ACTING CITY ENGINEER
Gregory Rodzenko

GLENDALE

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SOIL BORING LOGS

Registered Professional Engineer (Civil)
CERTIFICATE NO.
43308
JESSICA L.
MULLEN
Date Signed 6-5-12
ARIZONA, U.S.A.
Expires: 9-30-13

NOTICE TO CONTRACTORS

Sealed bids shall be either mailed to the City of Glendale Engineering Department, 5850 West Glendale Avenue, Glendale, Arizona, 85301, or hand-delivered to the Engineering Department office, third floor, 5850 West Glendale Avenue, Glendale, Arizona, for furnishing all plant, material, equipment and labor, and to complete construction of: PROJECT NO. 091005 - GLENDALE MUNICIPAL AIRPORT RUNWAY SAFETY IMPROVEMENTS. This work is for the construction of asphalt blast pads at each end of the runway, relocation of an existing blast deflector fence, ramp marking improvements and the relocation of an existing windcone.

Bids must be received by the Engineering Department of the City of Glendale no later than 10:00 AM, July 3, 2012. Any bid received after that time will not be considered and will be returned to the bidder. At that time, the bids will be publicly opened and read aloud in the Engineering Department Conference Room, 5850 West Glendale Avenue, Glendale, Arizona.

A pre bid conference will be held on June 26, 2012, at 9:00 AM, in the Glendale Municipal Airport Conference Room, 6801 N. Glen Harbor Boulevard, Suite 201, Glendale, Arizona. Bidders, contractors, and other interested parties are invited to attend this conference which will be conducted by the Owner and Engineer to answer any questions.

Plans, specifications and contract documents may be examined, and copies may be obtained at City of Glendale Engineering Department, 5850 West Glendale Avenue, Glendale, Arizona. A non refundable charge of $40 shall be paid for each set of plans and specifications issued from this office.

Each bid shall be in accordance with the plans, specifications and contract documents, and shall be set forth and submitted on the BID DOCUMENTS included with the project specifications book. The BID DOCUMENTS may be removed from the project specifications book and submitted independently of such book. Each bid shall be accompanied by a proposal guarantee, in the form of a certified or cashier's check or bid bond for ten percent (10%) of the amount of bid, made payable to the order of the City of Glendale, Arizona, to insure that the successful bidder will enter into the contract if awarded to him and submit the required Certificate of Insurance, Payment Bond and Performance Bond. All proposal guarantees, except those of the three lowest qualified bidders, will be returned immediately following the opening and checking of proposals. The proposal guarantees of the three lowest qualified bidders will be returned immediately after the contract documents have been executed by the successful bidder. The proposal guarantee shall be declared forfeited as liquidated damages if the successful bidder refuses to enter into said contract or submit the Certificate of Insurance, Payment Bond and Performance Bond after being requested to do so by the City of Glendale, Arizona.

The City of Glendale reserves the right to reject any or all bids or waive any informality or irregularity in a bid. No bidder may withdraw his bid for a period of seventy (70) days after opening and reading of the bids.

The City of Glendale is an equal opportunity employer and minority business enterprises and women's business enterprises are encouraged to submit bids.

CITY OF GLENDALE, ARIZONA

Published: June 7 and 14, 2012
The Glendale Star

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INFORMATION FOR BIDDERS

1. ELIGIBILITY OF CONTRACTORS: When calling for bids for contracts for public work to be performed on behalf of the State or any political subdivision thereof, which will be paid for from public funds, no bid shall be considered for performance of a contract, including construction work which is not submitted by a bidder duly licensed as a contractor in this State. No bid shall be awarded to any contractor or entity not authorized to do business in the State of Arizona by the Arizona Corporation Commission, as required by statute.

2. PROPOSAL: Bids to receive consideration shall be made in accordance with the following instructions:

   (a) Before submitting a bid, bidders shall carefully examine the plans and specifications and contract documents, visit the site of the work, fully inform themselves as to all existing conditions and limitations.

   (b) Bids shall be submitted on the "PROPOSAL" forms provided and delivered to the City of Glendale Engineering Department on or before the day and hour set in the "NOTICE TO CONTRACTORS," as published. Bids shall be enclosed in a sealed envelope marked on the outside lower right-hand corner indicating:

      1. The bidder's name and address.
      2. The project number.
      3. The title of the project.
      4. The time and date the bids are to be received.

   (c) It is the sole responsibility of the bidder to see that his bid is received in proper time. Any bids received after the scheduled closing time for receipt of bids will be returned to the bidder unopened.

   (d) The signatures of all persons shall be in longhand. Any interlineations, alterations, or erasures must be initialed by the signer of the bid.

   (e) Bids shall not contain any recapitulations of the work to be done. No oral, telegraphic, telephonic, or modified proposals will be considered.

3. BID SECURITY: Each proposal shall be accompanied by a proposal guarantee in the form of a certified or cashier's check or bid bond, with a properly executed Power of Attorney attached, in an amount equal at least to ten percent (10%) of the total proposal payable without condition to the City. If a bid bond is submitted with the bid it shall be issued by a company licensed with the Arizona Department of Insurance and authorized to issue such bonds in this state. **NO BONDS ISSUED BY INDIVIDUAL SURETIES WILL BE ACCEPTED. The company issuing the bid bond shall have a rating of not less than A- in the BEST rating available at the time this project was let to bid.** The proposal guarantee shall guarantee that the bidder, if awarded the contract, will, within ten (10) working days after the award, execute such contract in accordance with the proposal and in manner and form required by the contract documents, and will furnish good

and sufficient bond for the faithful performance of the same, a payment bond and a certificate of insurance. The bid securities of the three (3) lowest bidders will be retained until the contract is awarded, or other disposition made thereof. The bid securities of all bidders, except the three (3) lowest, will be returned promptly after the canvass of bids. In the event the Contractor fails, within ten (10) working days after the award, to execute said Contract and deliver the Performance and Labor and Material Payment Bonds and the Certificate of Insurance, the Bid Security shall become the property of the City.

4. WITHDRAWAL OF BID: Any bidder may withdraw his bid, either personally, by telegram or by written request, at any time prior to the scheduled closing time for receipt of bids. No bid may be withdrawn by telephone. Any bid withdrawn will not be opened and will be returned to the bidder. After opening and reading of the bids, no bidder may withdraw his bid for a period of seventy (70) days from the date of opening and reading.

5. LATE BIDS: Bids received after the scheduled closing time for receipt of bids, as contained in the "Notice to Contractors," will not be considered and will be returned to the bidder.

6. AWARD OR REJECTION OF BIDS: The contract will be awarded to the lowest and best qualified responsive bidder complying with these instructions and with the "NOTICE TO CONTRACTORS." The City of Glendale, Arizona, however, reserves the right to accept or reject any or all bids or to waive any or all informalities or irregularities in the bid.

7. BIDDERS INTERESTED IN MORE THAN ONE BID: No person, firm or corporation shall be allowed to make, file, or be interested in more than one (1) bid for the same work unless alternate bids are called for in the specifications or any addenda. A person, firm, or corporation who has submitted a sub-proposal to a bidder, or who has quoted prices on materials to a bidder is not thereby disqualified from submitting a sub-proposal or quoting prices to other bidders.

8. CONTRACT AND BONDS: The form of contract, which the successful bidder as Contractor will be required to execute and the forms of bonds which he shall be required to furnish are included in the contract documents and should be carefully examined by the bidder. The successful bidder shall use the forms provided or such other forms as are acceptable by the City. The Contract and Performance and Labor and Material Payment Bonds will be executed in three (3) original counterparts. All bonds shall be issued by companies licensed with the Arizona Department of Insurance and authorized to issue such bonds in this state. **NO BONDS ISSUED BY INDIVIDUAL SURETIES WILL BE ACCEPTED. The company issuing any bond shall have a rating of not less than A- in the BEST rating available at the time this project was let to bid.**

9 INSURANCE REQUIREMENTS: Contractor, and each Sub-contractor performing work or providing materials related to this Agreement must procure and maintain the insurance coverages described (collectively, "Contractor's Policies"), until each Parties' obligations under this Agreement are completed. Contractor must at all times relevant hereto carry a commercial general liability policy with a combined single limit of at least $1,000,000 per occurrence and $2,000,000 annual aggregate. **Contracts in excess of $250,000 shall require $2,000,000 single occurrence/$5,000,000 annual aggregate.**

Sub-contractors must at all times relevant hereto carry a general commercial liability policy with a combined single limit of at least $1,000,000 per occurrence.

This commercial general liability insurance must include independent contractors' liability, contractual liability, broad form property coverage, products and completed operations, XCU hazards if requested by the City, and a separation of insurance provision.

These limits may be met through a combination of primary and excess liability coverage.

Auto. A business auto policy providing a liability limit of at least $1,000,000 per accident for Contractor and $1,000,000 per accident for Sub-contractors and covering owned, non-owned and hired automobiles.

Workers' Compensation and Employer's Liability. A workers' compensation and employer's liability policy providing at least the minimum benefits required by Arizona law.

Equipment Insurance. Contractor must secure, pay for, and maintain all-risk insurance as necessary to protect the City against loss of owned, non-owned, rented or leased capital equipment and tools, equipment and scaffolding, staging, towers and forms owned or rented by Contractor or its Sub-contractors.

10. SUBCONTRACTORS LISTING AND CERTIFICATION OF CONTRACT COMPLIANCE: The contractor will be required to furnish the form of subcontractors listing and certification of contract compliance with the executed contract documents. This information is requested for tracking and insurance purposes only.

11. INTERPRETATION OF PLANS AND DOCUMENTS: If any person contemplating a bid for proposed contract is in doubt as to the true meaning of any part of the plans, specifications, or other proposed contract documents, or finds discrepancies in or omissions from the plans and specifications, he may submit to the Engineering Department, a written request for an interpretation or correction thereof. The person submitting the request will be responsible for its prompt delivery. Questions received less than ninety-six (96) hours before the bid opening time may not be answered. Any interpretation or correction of the documents will be made only by Addendum, duly issued and a copy of such Addendum will be mailed or delivered to each person receiving a set of such documents. The City of Glendale will not be responsible for any other explanations or interpretations of the proposed documents.

12. CHANGES TO PLANS AND DOCUMENTS: Any changes to the plans and documents shall be made only by Addendum. No verbal or other changes to the plans and documents will be valid. A copy of each Addendum will be mailed or delivered as provided in Section 13 below.

13. ADDENDUM: Any addenda will be faxed, mailed or delivered to all who are known by the City to have received a complete set of bid documents, and to offices where bid documents have been filed for review purposes. It is the responsibility of each bidder to ascertain that he has received all addenda issued by telephoning the office identified in the NOTICE TO CONTRACTORS as the location where bid documents are available prior to submitting his bid.

Bidders shall acknowledge all addenda in the appropriate location on the "PROPOSAL" form. Failure to acknowledge receipt of Addenda shall render the bid proposal non-responsive and it will be rejected.

14. ASSIGNMENT OF CONTRACT: No assignment by the Contractor of any contract to be entered into hereunder, or any part thereof, or of funds to be received thereunder by the Contractor, will be recognized by the Owner by the Owner unless such assignment has had prior approval of the Owner, and the Surety has been given due notice of such assignment in writing and has consented thereto in writing.

15. PLANS AND SPECIFICATIONS TO SUCCESSFUL BIDDER: The successful bidder may obtain five (5) sets of plans and specifications for this project from the City.

16. TIME OF COMPLETION: The Contractor shall commence work under this project on or before the tenth day following receipt of the Notice to Proceed for that project from the City of Glendale and shall fully complete all work under the project within sixty (60) consecutive calendar days from and including the date of receipt of such Notice to Proceed. Time is of the essence in the completion of all work required under this contract. The Contractor shall, at all times, during the continuance of the contract, prosecute the work with such force and equipment as is sufficient to complete all work within the time specified.

17. CITY OF GLENDALE TRANSACTION PRIVILEGE TAX: The City of Glendale transaction privilege tax shall **NOT** be waived under the provisions of this contract. The current privilege tax rate can be obtained from the City of Glendale Sales Tax and Licenses Department. The Contractor shall be responsible for reporting and payment of all city, county, state or federal taxes.

18. PRE-BID CONFERENCE: A pre-bid conference will be held on June 26, 2012, at 9:00 A.M., at the Glendale Municipal Airport Conference Room, 6801 North Glen Harbor Boulevard., Glendale, Arizona. Bidders, contractors, and other interested parties are invited to attend this conference which will be conducted by the Owner and Engineer to answer any questions.

19. ALTERNATES: Alternate proposals will not be considered unless called for in the documents or any addenda thereto. When alternates are requested, all requested alternates or alternate bid items, unless otherwise stated, shall be bid. If no change in the base bid will occur with the alternate, enter "No Change."

20. APPROVAL OF SUBSTITUTIONS: The materials, products and equipment described in the Documents and Addenda establish a standard or required function, dimension, appearance and quality to be met by any proposed substitution. No substitute will be considered, before bid opening, unless written request for approval has been received by the City Engineer at least ten (10) working days prior to the scheduled closing time for receipt of bids. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute including any drawings, cuts, performance and test data and any other information necessary for evaluation of the substitute. Bidder shall not be entitled to approval of a substitute.

    If a substitute is approved, the approval shall be set forth in an Addendum. Bidders shall not rely upon approvals made in any other manner.

21. USE OF "EQUALS": When the specifications for materials, articles, products and equipment state "or equal," contractor may bid upon, and use materials, articles, products and equipment which will perform equally the duties imposed by the general design. The City Engineering Department will have the final approval of all materials, articles, products and equipment proposed to be used as an "equal." It shall not be purchased or installed without the prior written approval from the City Engineering Department.

    Approvals for "equals," before bid opening, may be requested in writing to the City Engineering Department for approval. Requests must be received at least ten (10) days prior to the date set for opening the Bid Proposals. The request shall state the name of the material, article, product or equipment for which the item is sought to be considered an equal and a complete description of the proposed equal including any drawings, cuts, performance and test data and any other information necessary for approval of the equal. All approvals will be issued in the form of an addendum.

22. EXAMINATION OF CONTRACT DOCUMENTS AND VISIT SITE: Before submitting a Bid Proposal, bidders should carefully examine the Contract Documents, visit the site of the work, fully inform themselves as to all existing conditions and limitations. No consideration will be granted for any alleged misunderstanding of the material, articles or piece of equipment to be furnished or work to be done. It is understood that the tender of the Bid Proposal carries with it the agreement to all items and conditions referred to herein or indicated in the Contract Documents.

23. BIDDERS IN DEFAULT: No bid will be awarded to any person, firm or corporation that is not authorized by the Arizona Corporation Commission to do business in the State of Arizona, in arrears or is in default to the City of Glendale upon any debt or contract, or that is a defaulter as surety or otherwise upon any obligation to the City of Glendale, or has failed to faithfully perform any previous contract with the City of Glendale.

24. FEDERAL AID REQUREMENTS: Attention of bidders is particularly called to the requirements for Disadvantaged Business Enterprise (DBE) participation as described in the Notice to Contractors of these Specifications. The apparent successful bidder will be required to furnish the names and addresses of DBE firms that will participate in the contract, a description of the work each named DBE firm will perform, and the dollar amount of participation by each named DBE firm.

    The DBE goal for this project is 10% of the total amount bid. Based on the 9th Circuit Court Decision in Western States Paving Company v. Washington State Department of Transportation, the City of Glendale has determined that it is appropriate to use a race/gender neutral goal. The City of Glendale encourages all bidders to take active race/gender neutral steps to include DBE's in this and other airport contracts. Race/gender neutral steps include: unbundling large contracts, subcontract work the prime contractor may self-perform, provide bonding or financing assistance, provide technical assistance, etc. This contract can be awarded without the lowest responsive bidder meeting the goal or demonstrating good faith effort to meet the goal. In the event of a conflict, the information contained in this paragraph takes precedence over other information presented in these specifications.

    Attention of bidders is particularly called to the requirements concerning the payment of not less than the prevailing wage and salary rates as set forth in the Contract Documents and the conditions of employment with respect to certain categories and classifications of employees. The prevailing

wage and salary rates of pay, set forth in the Contract Documents and bound herein, are the minimums to be paid during the life of the Contract. It is therefore the responsibility of bidders to inform themselves as to local labor conditions, such as the length of work day and work week, overtime compensation, health and welfare contributions, labor supply and prospective changes or adjustments of rates.

Attention of bidders is particularly called to the requirements for nondiscrimination, equal employment opportunity and affirmative action both for themselves and their subcontractors. The bidder to whom a Contract for Work is awarded will be required to comply with all provisions of Executive Order 11246 of 24 September, 1965, as amended by Executive Order 11375 of 13 October, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

A Certification of Nonsegregated Facilities must 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.

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. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

A Certification of Nonsegregated Facilities must be submitted prior to the award of a subcontract exceeding $10,000, which is not exempt from the provisions of the equal opportunity clause.

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. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

Compliance Reports: Within 30 days after award of this Contract, the Contractor shall file a compliance report (Standard Form 100) if:

(a) The Contractor has not submitted a complete compliance report within 12 months preceding the date of award; and

(b) The Contractor is within the definition of "employer" in Paragraph 11e (3) of the instructions included in Standard Form 100.

The Contractor shall require the subcontractor on any first-tier subcontract, irrespective of dollar amount, to file Standard Form 100 within 30 days after award of the subcontract if the above two conditions apply. Standard Form 100 will be furnished upon request.

It shall be a condition of the Contract, and shall be made a condition of each subcontract entered into pursuant to the Contract, that the Contractor and any subcontractor shall not require any laborer or

mechanic employed in performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health or safety, as determined under construction safety and health standards promulgated by the United States Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (83 Stat. 96).

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246, as amended).

A. 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.

B. 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:

GOALS FOR MINORITY PARTICIPATION IN EACH TRADE	GOALS FOR FEMALE PARTICIPATION IN EACH TRADE
19.6%	6.9%

The goals are applicable to all 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 also is subject to the goals for both its federally involved and nonfederally involved construction.

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 must 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 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.

C. The contractor shall provide written notification to the Director 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; estimated dollar amount of the subcontract; and the geographical area in which the subcontract is to be performed under 29 CFR Part 5 (paragraph 5.6(b)).

D. As used in this notice and in the contract resulting from this solicitation, the "covered area" is The City of Glendale, Arizona.

When a determination has been made to award a contract or subcontract to a specific contractor, such contractor is required, prior to the award or after the award, or both, to furnish such other information as the FAA, the sponsor, or the Director of OFCCP requests.

Contractors and subcontractors may satisfy requirements of the EEO contract clause by stating in all solicitations or advertisements for employees that:

> "All qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin."

Or by using the single advertisement in which appears in clearly distinguishable type, the phrase:

> "An equal opportunity employer."

Preaward Compliance Review. Upon request of the Department of Labor, a sponsor will not enter into contracts or approve the entry into contracts or subcontracts with any bidder, prospective prime contractor, or proposed subcontractor named by the Department of Labor until a preaward compliance review has been conducted and approved with a determination that the bidder, prospective prime contractor or proposed subcontractor will be able to comply with the provisions of the Equal Opportunity Clause.

A bid may not be accepted by a contractor whose name appears on the current list of ineligible contractors published by the Department of Labor.

25. CIVIL RIGHTS ACT OF 1964, TITLE VI – CONTRACTOR CONTRACTUAL 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:

A. Compliance with Regulations. The contractor shall comply with the Regulations relative to nondiscrimination in federally assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.

B. Nondiscrimination. The contractor, with regard to the work performed by it during the contract, shall 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 shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

C. 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 shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

D. Information and Reports. The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto and shall 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 (FAA) to be pertinent to ascertain compliance with such Regulations, orders, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to the sponsor or the FAA, as appropriate, and shall set forth what efforts it has made to obtain the information.

E. Sanctions for Noncompliance. In the event of the contractor's noncompliance with the nondiscrimination provisions of this contract, the sponsor shall impose such contract sanctions as it or the FAA may determine to be appropriate, including, but not limited to:

- Withholding of payments to the contractor under the contract until the contractor complies, and/or
- Cancellation, termination, or suspension of the contract, in whole or in part.

F. Incorporation of Provisions. The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA 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 supplier as a result of such direction, the contractor may request the Sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

26. AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, SECTION 520 - GENERAL CIVIL RIGHTS PROVISIONS: The contractor assures that it will comply with pertinent statutes, Executive orders and such rules as are promulgated to assure 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 obligates the tenant/concessionaire/lessee or its transferee for the period during which Federal assistance is extended to the airport a program, except where Federal assistance is to provide, or is in the form of personal property or real property or interest therein or 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. In the case of contractors, 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.

27. LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

A. No Federal appropriated funds shall be paid, by or on behalf of the contractor, 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 the making of any Federal grant and the amendment or modification of any Federal grant.

B. 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 any Federal grant, the contractor shall complete and submit Standard Form-LLL, "Disclosure of Lobby Activities," in accordance with its instructions.

28. ACCESS TO RECORDS AND REPORTS: The Contractor shall 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 representative's 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.

29. DISADVANTAGED BUSINESS ENTERPRISES

A. 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.

B. 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 7 days from the receipt of each payment the prime contractor receives from the City of Glendale. The prime contractor agrees further to return retainage payments to each subcontractor within seven 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 City of Glendale. This clause applies to both DBE and non-DBE subcontractors.

30. 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).

31. BREACH OF CONTRACT TERMS: Any violation or breach of terms of this contract on the part of the contractor or their 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 shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.

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

33. 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.

34. VETERAN'S PREFERENCE: In the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to Veterans of the Vietnam era and disabled veterans as defined in Section 515(c)(1) and (2) of the Airport and Airway Improvement Act of 1982. However, this preference shall apply only where the individuals are available and qualified to perform the work to which the employment relates.

35. CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS 29 CFR PART 5

A. 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.

B. 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.

C. 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.

D. 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.

36. CLEAN AIR AND WATER POLLUTION CONTROL

Contractors and subcontractors agree:

A. 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;

B. 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;

C. 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;

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

37. BIDDERS ARE HEREBY NOTIFIED:

A. Federal Funds are being used to assist in the construction of this project and, accordingly, all applicable Federal laws must be complied with.

B. The proposed contract is under and subject to Executive Order 11246, as amended, of 24 September 1965, and to the Equal Employment Opportunity (EEO) and Federal Labor Standard Provisions.

C. All labor on the project shall be paid no less than the prevailing minimum wage rates established by the U.S. Secretary of Labor and contained in the specifications and shall comply with all provisions of the Davis-Bacon Act.

D. The Bidder agrees to comply with the provisions of the State of Arizona Executive Order 75-5, dated April 28, 1975, as amended by Executive Order 99-4, relating to equal opportunity.

E. The Bidder must supply all information required by the bidding documents or specifications.

F. Each Bidder must complete, sign, and submit with his bid, an "Authorized Signature Form", a "List of Subcontractors", a "Non-Collusion Affidavit", a "Certification of Nonsegregated Facilities," a statement entitled "Bidder's Statement on Previous Contracts Subject to EEO Clause," an "Assurance of Disadvantaged Business Enterprise Participation," a "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion," a "Certification Regarding Foreign Countries," a "Buy American Certificate," and a "Certificate of Insurability" as contained in the Contract Documents.

G. A contractor having 50 or more employees and his subcontractors having 50 or more employees and who may be awarded a contract of $50,000 or more will be required to maintain an affirmative action program, the standards for which are contained in the specifications.

H. To be eligible for award, each Bidder must comply with the affirmative action requirements, which are contained in the specifications.

I. Disadvantaged business enterprise will be afforded full 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 of any contract entered into pursuant to this advertisement.

J. Women will be afforded equal opportunity in all areas of employment. However, the employment of women shall not diminish the standards of requirements for the employment of minorities.

END OF INFORMATION FOR BIDDERS

WAGE AND LABOR REQUIREMENTS

SECTION A (Federal Aviation Administration Requirements)

3.01 Airport Improvement Project. The work in this Contract is included in Airport Improvement Program 3-04-0064-20, which is being undertaken and accomplished by the Owner in accordance with the terms and conditions of a grant agreement between the Owner and the United States, under the Airport Improvement Act of 1982, as amended by the Airport and Airway Safety and Capacity Expansion Act of 1987, and Part 152 of the Federal Aviation Regulations (14 CFR Part 152), pursuant to which the United States has agreed to pay a certain percentage of the costs of the project that are determined to be allowable project costs under that Act. The United States is not a party to this Contract and no reference in this Contract to the FAA or any representative thereof, or to any rights granted to the FAA or any representative thereof, or the United States, by the Contract, make the United States a party to this Contract.

3.02 Consent of Assignment. The Contractor shall obtain the prior written consent of the Owner to any proposed assignment of any interest in or part of this contract.

3.03 Convict Labor. No convict labor may be employed under this contract.

3.04 Veterans Preference. In the employment of labor (except in executive, administrative, and supervisory positions), preference shall be given to honorably discharged veterans of the Vietnam era and disabled veterans (as defined in Section 47112 of Title 49, United States Code. However, this preference shall apply only where individuals are available and qualified to perform the work to which the employment relates.

3.05 Withholding: Sponsor from Contractor. Whether or not payments or advances to the Owner are withheld or suspended by the FAA, the Owner may withhold or cause to be withheld from the Contractor as much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics employed by the Contractor or any Subcontractor on the work the full amount of wages required by this Contract.

3.06 Nonpayment of Wages. If the Contractor or Subcontractor fails to pay any laborer or mechanic employed or working on the site of the work any of the wages required by this Contract, the Owner may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment or advance of funds until the violations cease.

3.07 FAA Inspection and Review. The Contractor shall allow any authorized representative of the FAA to inspect and review any work or materials used in the performance of this Contract.

3.08 Subcontracts. The Contractor shall insert in each of his subcontracts the provisions contained in paragraphs 3.01, 3.03, 3.04, 3.05, 3.06, and 3.07, and also a clause requiring the Subcontractors to include these provisions in any lower tier subcontracts which they may enter into together with a clause requiring this insertion in any further subcontracts that may in turn be made.

3.09 Contract Termination. A breach of paragraphs 3.06, 3.07, and 3.08 may be grounds for termination of the Contract.

3.10 Buy American Requirements - Unless otherwise approved by the FAA, no steel or manufactured products produced outside the United States will be permitted for use on this project.

SECTION B (Secretary of Labor Requirements)

3.11 Minimum Wages.

(a) All laborers and mechanics employed or working upon the site of the work, shall be paid unconditionally not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued 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 equivalents thereof) due at the time of payment computed at rates not less than those contained in the wage 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 (3.10) (g) 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 paragraph 3.13. Laborers and mechanics performing work in more than one 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 paragraph (b) 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 be easily seen by the workers.

(b) The contracting officer shall require that any class of laborers or mechanics 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.

(c) 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 when 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. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(d) 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. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(e) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1) (C) or (D) 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.

(f) 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.

(g) 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. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

3.12 Withholding. The FAA 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 the work all or part of the wages required by the Contract, the FAA may, after written notice to the sponsor, 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.

3.13 Payrolls and Basic Records.

(a) 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 Section 1 (b) (2) (B) of 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 cost 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. (Approved by the Office of Management and Budget under OMB control numbers (1215-0140 and 1215-0017.)

(b) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the sponsor for transmission to the FAA. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 5.5(a) (i) of Regulations, 29 CFR Part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-0014-1), U.S. Government Printing Office, Washington, D.C. 20402. The prime Contractor is responsible for the submission of copies of payrolls by all Subcontractors. (Approved by the Office of Management and Budget under OMB control number 1215-0149.)

(c) 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 maintained under 5.5(a) (3) (i) of Regulations, 29 CFR Part 5 and that such information is correct and complete;

(2) That each laborer or 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.

(d) 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 (3.12) (C) of this section.

(e) 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.

(f) The Contractor or Subcontractor shall make the records required under paragraph (3.12) (a) of this section available for inspection, copying or transcription by authorized representatives of the FAA 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, FAA may, after written notice to the sponsor, 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.

3.14 Apprentices and Trainees.

(a) Apprentices will be permitted to work 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 journey men on the job site in any craft classification shall not be greater than the ration 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 ration 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 for the apprentice's level of progress, shall be 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.

(b) 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 who 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 of work performed until an acceptable program is approved.

(c) 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.

(d) Application of CFR 5.59(a)(4). On Contracts in excess of $2,000, the employment of all apprentices and trainees, as defined in 29 CFR 5.2(c), shall be subject to the provisions of 29 CFR 5.5(a)(4) (see paragraphs 3.13 (a), (b) and (c) above).

3.15 Compliance with Copeland (Anti-kickback) Act Requirements. The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this Contract.

3.16 Compliance with Contract Work Hours and Safety Standards Act. The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

3.17 Subcontracts. The Contractor or Subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a) (1) through (10) and such other clauses as the FAA 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 5.5.

3.18 Contract Termination: Debarment. A breach of the Contract clauses in 29 CFR 5.5 may be grounds for termination of the Contract, and for debarment as a Contractor and a Subcontractor as provided in 29 CFR 5.12.

3.19 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.

3.20 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.

3.21 Certification of Eligibility.

(a) 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).

(b) 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).

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

3.22 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 in any workweek in which he or she is employed on such work to work in excess of eight hours in any calendar day or 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 eight hours in a calendar day or in excess of forty hours in such workweek, whichever is greater.

3.22-1 Violation; Liability for Unpaid Wages; Liquidated Damages. In the event of any violation of the clause set forth in paragraph 3.22, the Contractor and any Subcontractor responsible therefor shall be liable for the unpaid wages. 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 3.22 in the sum of $10 for each calendar day or which such individual was required or permitted to work in excess of eight hours or in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 3.22.

3.22-2 Withholding for Unpaid Wages and Liquidated Damages. The FAA 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 moneys 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, 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 3.22-1.

3.22-3 Subcontracts. The Contractor or Subcontractor shall insert in any Subcontracts the clauses set forth in paragraph 3.22 through 3.22-3 and also a clause requiring the Subcontractors 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 3.22 through 3.22-3.

SECTION C (Equal Employment Opportunity Clause)

3.23 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 insure 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 solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration 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, as amended, of 24

September 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, as amended, of 24 September 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his/her books, records, and accounts by the FAA 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 cancelled, 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, as amended, of 24 September 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246, as amended, of 24 September 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 proceeding paragraph (1) and the provisions of paragraph (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, as amended, of 24 September, 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 FAA 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 FAA, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

SECTION D (Standard Federal Equal Employment Opportunity Construction Contract Specification (Executive Order 11246, as amended))

3.24 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 From 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 people 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 the North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

3.25 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.

3.26 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 must 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.

3.27 The Contractor shall implement the specific affirmative action standards provided in paragraphs 3.30a through p 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 towards its goals in each craft during the period specified.

3.28 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, as amended, or the regulations promulgated pursuant thereto.

3.29 In order for the nonworking training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training

period and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

3.30 The Contractor shall take specific affirmative actions to ensure EEO. 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 organization's 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 therefor 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 woman 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 3.30b 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, layoffs, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such as 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 nonsegregated 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 supervisors' adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

3.31 Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (3.30a through p). 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 3.30a through p 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.

3.32 A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide EEO and to take affirmative action for all minority groups, both male and female, and all women, both minority and nonminority. Consequently, the Contractor may be in violation of the executive order if a particular group is employed in a substantially desperate 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).

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

3.34 The Contractor shall not enter into any subcontract with any person or firm debarred from Government Contracts pursuant to Executive Order 11246, as amended.

3.35 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 OFCCP. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

3.36 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 3.30 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.

3.37 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.

3.38 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).

SECTION E (DOT Title VI Requirements)

3.39 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:

(a) Compliance with Regulations. The Contractor shall comply with the regulations relative to nondiscrimination in federally-assisted programs of the Department of Transportation (hereinafter, "DOT") Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this Contract.

(b) Nondiscrimination. The Contractor, with regard to the work performed by it during the Contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of Subcontractors, including procurement of materials and leases of equipment. The Contractor shall not participate either directly or indirectly in the discrimination prohibited by Section 21.5 of the Regulations, including employment practices when the Contract covers a program set forth in Appendix B of the Regulations.

(c) Solicitation for Subcontracts, Including Procurement of Materials and Equipment. In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under subcontract, including procurement of materials or leases of equipment, each potential Subcontractor or supplier shall be notified by the Contractor of the Contractor's obligations under this Contract and the regulations relative to nondiscrimination on the grounds of race, color, or national origin.

(d) Information and Reports. The Contractor shall provide all information and reports required by the regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Owner or the Federal Aviation Administration (FAA) to be pertinent to ascertain compliance with such regulations, orders, and instructions. Where any information required of a Contractor is in the exclusive possession of another who fails or refuses to furnish this information, the Contractor shall so certify to the Owner or the FAA, as appropriate, and shall set forth what efforts it has made to obtain the information.

(e) Sanctions for Noncompliance. In the event of the Contractor's noncompliance with the nondiscrimination provisions of this Contract, the Owner shall impose such Contract

sanctions as it or the FAA may determine to be appropriate, including but not limited to --

(1) Withholding of payments to the Contractor under the Contract until the Contractor complies, and/or

(2) Cancellation, termination, or suspension of the Contract, in whole or in part.

(f) Incorporation of Provisions. The Contractor shall include the provisions of paragraphs a through e in every subcontract, including procurement of materials and leases of equipment, unless exempt by the regulations or directives issued pursuant thereto. The Contractor shall take such action with respect to any subcontract or procurement as the Owner or the FAA 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 supplier as a result of such direction, the Contractor may request the Owner to enter into such litigation to protect the interests of the Owner and, in addition, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

(g) Rights to Inventions - Materials. All rights to inventions and materials generated under this Contract are subject to regulations issued by the FAA and the recipient of the Federal grant under which this Contract is executed. Information regarding these rights is available from the FAA and the grantee.

SECTION F (Requirements Under The Disadvantaged Business Enterprise Program)

3.40 General. This project is subject to part 26, Title 49, Code of Federal Regulations entitled "Participation by Minority Business Enterprise in Department of Transportation (DOT) Programs" and Appendix A. Portions of the Regulations are set forth hereunder and the Regulations in their entirety are incorporated herein by this reference.

Bidders shall be fully informed respecting the requirements of the Regulations; particular attention is directed to the following matters:

(a) A Disadvantaged Business Enterprise (DBE) must be a small business concern as defined pursuant to Section 3 of U.S. Small Business Act, owned and controlled by socially and economically disadvantaged individuals (DBE's). Individuals who are reputably presumed to be socially and economically disadvantaged include women, Blacks, Hispanics, Native Americans, Asian-Pacific Americans and Asian-Indian Americans.

(b) A DBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, or vendor of material or supplies;

(c) A DBE joint venture partner must be responsible for a clearly defined portion of the work to be performed in addition to satisfying requirements for ownership and control. The DBE joint venturer must submit Schedule B contained in Section 23.87 of the Regulations;

(d) A DBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually

performing, managing, and supervising the work.

(e) Credit for a DBE vendor of materials or supplies is limited to 20 percent of the price, unless the vendor manufactures or substantially alters the goods;

(f) A DBE must be certified before credit may be allowed toward the DBE goal. The sponsor shall have available a directory or source list to facilitate identifying DBE's with capabilities relevant to general contracting requirements and to particular solicitations. The sponsor shall make the directory available to bidders and proposers in their efforts to meet the DBE requirements. It shall specify which firms the DOT, the sponsor or the Small Business Administration has determined to be eligible DBE's in accordance with procedures set forth in the Regulations;

3.41 The DBE program varies with the category of the airport and the size of the federal assistance furnished. The particular groupings and the corresponding value of the grant are as follows:

Group I

Airport Category	Amount of Federal Grant
General Aviation	$0 - $250,000
Non-Hub	$0 - $400,000
Large, Medium and Small Hubs	$0 - $500,000

Group II

General Aviation	Over $250,000
Non-Hub	Over $400,000

Group III

Large, Medium and Small Hubs	Over $500,000

3.42 The following assurances are applicable to projects in all the three groups above.

(a) Policy. It is the policy of the FAA that disadvantaged business enterprises as defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with Federal funds under this contract. Consequently, the DBE requirements of 49 CFR Part 26 applies to this contract.

(b) DBE Obligation. The contractor agrees to ensure the disadvantaged business enterprises as defined in 49 CFR Part 26 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal Funds provided under this Contract. In this regard, the Contractor shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that disadvantaged business enterprises have the maximum opportunity to compete for and perform contracts. The Contractor shall not discriminate on the basis of race, color, national origin or sex in the award and performance of FAA-assisted contracts.

(c) Failure to carry out the requirements set forth above shall constitute a breach of contract. After notification, this may result in termination of the Contract by the sponsor or such remedy, as the sponsor deems appropriate.

3.43 DBE Goals. The sponsor has established a total Disadvantaged Business Enterprise participation goal of 10 percent for this project. A Certificate of Assurance concerning this goal is included in the proposal and shall be executed by the bidder.

3.44 Award of Contract. The sponsor reserves the right to reject any or all bids. The award of contract, if it be awarded, will be to the lowest responsible and reliable bidder. In addition to any other requirements a bidder must meet to qualify as a responsive, responsible and reliable bidder, every such bidder must meet the following DBE requirements:

(a) If a bidder meets or exceeds the contract requirements for DBE goals and the bid is otherwise responsive and the sponsor considers the amount of the bid to be reasonable, such bidder will be the successful bidder. If there is more than one such bidder, the lowest monetary bidder will be the successful bidder.

(b) If the sponsor does not consider the amount of the bid of the bidders who meet or exceed the contract DBE goals to be reasonable, or if there are no such bidders, the bidder with the highest percentage of DBE participation of those bidders who did not meet or exceed the contract DBE goals, but who has demonstrated sufficient reasonable efforts to do so, will be considered. If the sponsor considers the amount of the bid to be reasonable, such bidder will be the successful bidder. If the sponsor considers the amount of such bid to be unreasonable, the remaining bids will be considered in descending order of the percentage of DBE participation until the sponsor considers both the amount of the bid under consideration and said bidder's efforts to meet said goals to be reasonable, in which event such bidder will be the successful bidder. If there is more than one such bidder, the lowest monetary bidder will be the successful bidder.

(c) If the sponsor does not consider the amount of any of the bidders with DBE participation to be reasonable, the sponsor may determine any bidder that has demonstrated sufficient reasonable efforts to meet the DBE contract goal to be the successful bidder, provided the sponsor determines the amount of the bid to be reasonable. If there is more than one such bidder, the lowest monetary bidder will be the successful bidder.

(d) Notwithstanding any of the above, the sponsor reserves the right to reject any or all bids and to waive any informality or technicality. Being the successful bidder, pursuant to the DBE requirements, does not mean that the contract is required to be awarded to said bidder or that the contract will be awarded at all.

3.45 DBE Information. After the bid opening and before award of the contract, those bidders/proposers that have submitted a contract price that has been determined to be reasonable will be asked by the sponsor, as a condition of remaining in competition for the award, to submit within 10 calendar days the names of DBE's they proposed to use, the type of subcontract work each DBE will perform, and the dollar value of each proposed DBE subcontract.

3.46 Subcontractor.

(a) No substitution of a DBE subcontractor shall be made at any time without the written consent of the sponsor.

(b) If a DBE subcontractor is unable to perform successfully and is to be replaced, the contractor will be required to make good faith efforts to replace the original DBE subcontractor with another DBE subcontractor.

SECTION G (Compliance with Nondiscrimination Laws)

Contractor shall comply with all federal, state and local nondiscrimination statutes in the operation, implementation and delivery of, including state and federal civil rights and disabilities laws. In particular the contractor shall ensure that the City of Glendale obligations for program, facility and service accessibility in Title II of the Americans with Disabilities Act are complied with in all activities arising under this contract, and shall hold harmless the Town for any and all loss, including but not limited to damages, costs or expenses, incurred or arising from any alleged violation of the Americans with Disabilities Act under the auspices of this contract unless resulting from an intentional or actual negligent act of the City and its employees.

Failure to comply with the nondiscrimination or accessibility requirements herein shall be construed as nonperformance and may result in termination of funding, civil action or both.

WAGE RATES: The following wage rates shall apply:

END OF FEDERAL WAGE AND LABOR REQUIREMENTS

General Decision Number: AZ120013 03/23/2012 AZ13

Superseded General Decision Number: AZ20100013

State: Arizona

Construction Type: Highway

Counties: Coconino, Maricopa, Mohave, Pima, Pinal, Yavapai and Yuma Counties in Arizona.

HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/06/2012
1	03/23/2012

CARP0408-005 07/01/2011

	Rates	Fringes
CARPENTER (Including Cement Form Work)	$ 23.58	8.49

ENGI0428-001 06/01/2010

	Rates	Fringes
OPERATOR: Power Equipment		
Group 1	$ 21.95	9.79
Group 2	$ 25.22	9.79
Group 3	$ 26.30	9.79
Group 4	$ 27.33	9.79

POWER EQUIPMENT OPERATORS CLASSIFICATIONS:

GROUP 1: A-frame boom truck, air compressor, Beltcrete, boring bridge and texture, brakeman, concrete mixer (skip type), conductor, conveyor, cross timing and pipe float, curing machine, dinky (under 20 tons), elevator hoist (Husky and similar), firemen, forklift, generator (all), handler, highline cableway signalman, hydrographic mulcher, joint inserter, jumbo finishing machine, Kolman belt loader, machine conveyor, multiple power concrete saw, pavement breaker, power grizzly, pressure grout machine, pump, self-propelled chip spreading machine, slurry seal machine (Moto paver driver), small self-propelled compactor (with blade-backfill, ditch operation), straw blower, tractor (wheel type), tripper, tugger (single drum), welding machine, winch truck

GROUP 2:
ALL COUNTIES INCLUDING MARICOPA: Aggregate Plant, Asphalt plant Mixer, Bee Gee, Boring Machine, Concrete Pump, Concrete Mechanical Tamping-Spreading Finishing Machine, Concrete Batch Plant, Concrete Mixer (paving & mobile),

Elevating Grader (except as otherwise classified), Field Equipment Serviceman, Locomotive Engineer (including Dinky 20 tons & over), Moto-Paver, Oiler-Driver, Operating Engineer Rigger, Power Jumbo Form Setter, Road Oil Mixing Machine, Self-Propelled Compactor (with blade-grade operation), Slip Form (power driven lifting device for concrete forms), Soil Cement Road Mixing Machine, Pipe-Wrapping & Cleaning Machine (stationary or traveling), Surface Heater & Planer, Trenching Machine, Tugger (2 or more drums).

MARICOPA COUNTY ONLY: Backhoe < 1 cu yd, Motor Grader (rough), Scraper (pneumatic tired), Roller (all types asphalt), Screed, Skip Loader (all types 3<6 cu yd), Tractor (dozer, pusher-all).

GROUP 3:
ALL COUNTIES INCLUDING MARICOPA: Auto Grade Machine, Barge, Boring Machine (including Mole, Badger & similar type directional/horizontal), Crane (crawler & pneumatic 15>100 tons), Crawler type Tractor with boom attachment & slope bar, Derrick, Gradall, Heavy Duty Mechanic-Welder, Helicopter Hoist or Pilot, Highline Cableway, Mechanical Hoist, Mucking Machine, Overhead Crane, Pile Driver Engineer (portable, stationary or skid), Power Driven Ditch Lining or Ditch Trimming Machine, Remote Control Earth Moving Machine, Slip Form Paving Machine (including Gunnert, Zimmerman & similar types), Tower Crane or similar type.

MARICOPA COUNTY ONLY: Backhoe<10 cu yd, Clamshell < 10 cu yd, Concrete Pump (truck mounted with boom only), Dragline <10 cu yd, Grade Checker, Motor Grader (finish-any type power blade), Shovel < 10 cu yd.

GROUP 4: Backhoe 10 cu yd and over, Clamshell 10 cu yd and over, Crane (pneumatic or crawler 100 tons & over), Dragline 10 cu yd and over, Shovel 10 cu yd and over.

All Operators, Oilers, and Motor Crane Drivers on equipment with Booms, except concrete pumping truck booms, including Jibs, shall receive $0.01 per hour per foot over 80 ft in addition to regular rate of pay

Premium pay for performing hazardous waste removal $0.50 per hour over base rate.

IRON0075-004 08/01/2011

COCONINO, MARICOPA, MOHAVE, YAVAPAI & YUMA COUNTIES

	Rates	Fringes
Ironworker, Rebar.....	$ 26.52	19.35

Zone 1: 0 to 50 miles from City Hall in Phoenix or Tucson
Zone 2: 050 to 100 miles - Add $4.00
Zone 3: 100 to 150 miles - Add $5.00
Zone 4: 150 miles & over - Add $6.50

LABO0383-002 06/01/2010

	Rates	Fringes
Laborers:		
Group 1	$ 17.61	4.35
Group 2	$ 18.63	4.35
Group 3	$ 19.42	4.35
Group 4	$ 20.51	4.35
Group 5	$ 21.49	4.35

LABORERS CLASSIFICATIONS:

GROUP 1: All Counties: Chipper, Rip Rap Stoneman. Pinal County Only: General/Cleanup Laborer. Maricopa County Only: Flagger.

GROUP 2: Asphalt Laborer (Shoveling-excluding Asphalt Raker or Ironer), Bander, Cement Mason Tender, Concrete Mucker, Cutting Torch Operator, Fine Grader, Guinea Chaser, Power Type Concrete Buggy

GROUP 3: Chain Saw, Concrete Small Tools, Concrete Vibrating Machine, Cribber & Shorer (except tunnel), Hydraulic Jacks and similar tools, Operator and Tender of Pneumatic and Electric Tools (not herein separately classified), Pipe Caulker and Back-Up Man-Pipeline, Pipe Wrapper, Pneumatic Gopher, Pre-Cast Manhole Erector, Rigger and Signal Man-Pipeline

GROUP 4: Air and Water Washout Nozzleman; Bio-Filter, Pressman, Installer, Operator; Scaffold Laborer; Chuck Tender; Concrete Cutting Torch; Gunite; Hand-Guided Trencher; Jackhammer and/or Pavement Breaker; Scaler (using boson's chair or safety belt); Tamper (mechanical all types).

GROUP 5: AC Dumpman, Asbestos Abatement, Asphalt Raker II, Drill Doctor/Air Tool Repairman, Hazardous Waste Removal, Lead Abatement, Lead Pipeman, Process Piping Installer, Scaler (Driller), Pest Technician/Weed Control, Scissor Lift, Hydro Mobile Scaffold Builder.

PAIN0086-001 04/01/2010

	Rates	Fringes
PAINTER		
PAINTER (Yavapai County only), SAND BLASTER/WATER BLASTER (all Counties)	$ 17.85	4.70

ZONE PAY: More than 100 miles from Old Phoenix Courthouse $3.50 additional per hour.

SUAZ2009-001 04/20/2009

	Rates	Fringes

CEMENT MASON	$ 19.28	3.99
ELECTRICIAN	$ 22.84	6.48
IRONWORKER (Rebar)		
Pima County	$ 23.17	14.83
Pinal County	$ 20.27	8.35
LABORER		
Asphalt Raker	$ 15.49	3.49
Compaction Tool Operator	$ 14.59	2.91
Concrete Worker	$ 13.55	3.20
Concrete/Asphalt Saw	$ 13.95	2.58
Driller-Core, diamond, wagon, air track	$ 16.94	3.12
Dumpman Spotter	$ 14.99	3.16
Fence Builder	$ 13.28	2.99
Flagger Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 12.35	1.59
Formsetter	$ 16.09	3.97
General/Cleanup Laborer Coconino, Maricopa, Mohave, Pima, Yavapai & Yuma	$ 14.54	3.49
Grade Setter (Pipeline)	$ 17.83	5.45
Guard Rail Installer	$ 13.28	2.99
Landscape Laborer	$ 11.39	
Landscape Sprinkler Installer	$ 15.27	
Pipelayer	$ 14.81	2.96
Powderman, Hydrasonic	$ 16.39	2.58
OPERATOR: Power Equipment		
Asphalt Laydown Machine	$ 21.19	6.05
Backhoe < 1 cu yd Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 17.37	3.85
Backhoe < 10 cu yd Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 18.72	3.59
Clamshell < 10 cu yd Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 18.72	3.59
Concrete Pump (Truck Mounted with boom only) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 19.92	7.10
Crane (under 15 tons)	$ 21.35	7.36
Dragline (up to 10 cu yd) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 18.72	3.59
Drilling Machine (including Water Wells)	$ 20.58	5.65
Grade Checker Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 16.04	3.68
Hydrographic Seeder	$ 15.88	7.67

Mass Excavator	$ 20.97	4.28
Milling Machine/Rotomill	$ 21.42	7.45
Motor Grader (Finish-any type power blade) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 21.92	4.66
Motor Grader (Rough) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 20.07	4.13
Oiler	$ 18.15	8.24
Power Sweeper	$ 16.76	4.44
Roller (all types Asphalt) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 18.27	3.99
Roller (excluding asphalt)	$ 15.65	3.32
Scraper (pneumatic tired) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 17.69	3.45
Screed Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 17.54	3.72
Shovel < 10 cu yd Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 18.72	3.59
Skip Loader (all types <3 cu yd)	$ 18.28	5.30
Skip Loader (all types 3 < 6 cu yd) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 18.64	4.86
Skip Loader (all types 6 < 10 cu yd)	$ 20.15	4.52
Tractor (dozer, pusher - all) Coconino, Mohave, Pima, Pinal, Yavapai & Yuma	$ 17.26	2.65
PAINTER		
Coconino, Maricopa, Mohave, Pima, Pinal & Yuma	$ 15.57	3.92
TRUCK DRIVER		
2 or 3 Axle Dump or Flatrack	$ 16.27	3.30
5 Axle Dump or Flatrack	$ 13.97	2.89
6 Axle Dump or Flatrack (< 16 cu yd)	$ 17.79	6.42
Belly Dump	$ 14.67	
Oil Tanker Bootman	$ 22.03	
Self-Propelled Street Sweeper	$ 13.11	5.48
Water Truck 2500 < 3900 gallons	$ 18.14	4.55
Water Truck 3900 gallons and over	$ 15.92	3.33
Water Truck under 2500 gallons	$ 15.94	4.16

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 union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows 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. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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

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SUPPLEMENTAL GENERAL CONDITIONS

1. GENERAL: By Ordinance No. 1110 New Series, the City of Glendale adopted the "Uniform Standard Specifications for Public Works Construction," which are sponsored and distributed by the Maricopa Association of Governments. Copies of these documents, with revisions, are on file in the office of the City Engineer of the City of Glendale, and are hereby made a part of these Contract Documents.

   Whenever in the Uniform Standard Specifications, the words "The Contracting Agency" are used, the meaning shall be the City of Glendale.

   In all cases where ASTM, AASHTO, AWWA, USAG, Federal, City of Phoenix, MAG Specifications, Maricopa County, Arizona State Highway, or other standard specifications are referred to, unless otherwise stated, revisions, supplements or addenda issued on or before the date of this contract, shall prevail. In the event of any conflict between these project specifications and the requirements of the plans, detail drawings, MAG Standard Details and Specifications, these project specifications shall prevail.

2. DEFINITIONS: The following terms, as used in or pertaining to the Contract Documents, are defined as follows:

   CITY: The word "City" refers to the City of Glendale, Arizona. The official representative of said City in these proceedings shall be the City Engineer.

   CONTRACTOR: The word "Contractor" means the person, firm, or corporation with whom the Contract is made by the City.

   MATERIALS: The term "Materials" includes, in addition to materials incorporated in the project, equipment and other material used and/or consumed in the performance of the work.

   SUBCONTRACTOR: The word "Subcontractor" includes those having a direct contract with the Contractor and those who furnish material worked to a special design according to the plans and/or specifications for this work, but does not include those who merely furnish materials not so worked.

   ENGINEER: The word "Engineer" means a person, firm or corporation duly authorized by the City, to act for the City in staking out the work, inspecting materials and construction, and interpreting plans and specifications.

   CONTRACT DOCUMENTS: The words "Contract Documents" mean the Notice to Contractors, Information for Bidders, "Uniform Standard Specifications for Public Works Construction," MAG General Conditions, Supplemental General Conditions, Special Provisions, Supplemental Specifications, Proposal, Contract, Certificates of Insurance, Plans and Addenda thereto.

3. PROPOSAL QUANTITIES: It is expressly understood and agreed by the parties hereto that the quantities of the various classes of work to be done and material to be furnished under this Contract, which have been estimated as stated in the Proposal, are only approximate and are to be used

SOLELY for the purpose of comparing, on a consistent basis, the proposals offered for the work under this Contract; and the Contractor further agrees that the City will not be held responsible if any of the quantities shall be found incorrect; and the Contractor will not make any claim for damages or for loss of profits because of a difference between the quantities of the various classes of work as estimated and the work actually done. If any error, omission, or mis-statement is found to occur in the estimated quantities, the same shall not invalidate this Contract or release the Contractor from the execution and completion of the whole or any part of the work in accordance with the specifications and the plans herein mentioned, or for the prices herein agreed upon and fixed therefore, or excuse him from any of the obligations or liabilities hereunder, or entitle him to any damages or compensation except as may be provided for in this Contract.

4. WITHDRAWAL OF PROPOSALS: No proposal shall be withdrawn following the opening and reading of the bids for a period of 50 days from the date of opening without the consent of the contracting agency through the body or agent duly authorized to accept or reject the proposal.

5. LOSSES AND DAMAGES: All loss or damage arising out of the nature of the work to be done or from the action of the elements, or from any unforeseen circumstances in the prosecution of the same, or from any unusual obstructions or difficulties which may be encountered in and/or during the prosecution of the work, or from any casualty whatsoever of every description, shall be sustained and borne by the Contractor at his own cost and expense except as otherwise provided by the contract documents or the laws of the State of Arizona.

6. DUST PREVENTION: The Contractor shall take whatever steps, procedures or means required to prevent abnormal dust conditions due to his construction operations in connection with this contract. The dust control measures shall be maintained at all times during construction of the project, to the satisfaction of the Engineer, in accordance with the requirements of the "Maricopa County Health Department Air Pollution Control Regulations" which have been adopted pursuant to A.R.S. § 36-779.

   The Contractor shall be required to obtain the necessary permit from the Maricopa County Air Pollution Control Bureau, 1001 N. Central Ave., Phoenix, Arizona 85004 - telephone (602) 506-6727.

7. EXCESS MATERIAL: Excess material shall be removed from the work site and wasted at a location approved by the Engineer. Broken concrete and asphalt may be delivered to the Glendale Sanitary Landfill located at 115th Avenue and Glendale Avenue. The prevailing regulations and fee schedule <u>will not be waived for work under this project</u>. All materials, to be disposed of at the landfill, shall be weighed and disposed of at the prevailing rate.

8. STOCKPILE OF MATERIALS: The Contractor may place or stockpile materials in the public right-of-way, if approved by the Engineer, provided they <u>do not</u> prevent access to adjacent properties or prevent compliance with traffic regulations.

   Traffic <u>shall not</u> be required to travel over stockpiled materials, and proper dust control shall be maintained.

9. REFUSE COLLECTION ACCESS: At any time the project construction shall require the closure or disruption of traffic in any roadway, alley, or refuse collection easement such that normal refuse

collection will be interfered with, the Contractor shall, at least 48 hours prior to causing such closure or disruption, make arrangements with the Field Operations Department in order that refuse collection service can be maintained.

10. CLEAN-UP: After all work under this contract is completed, the Contractor shall remove all loose concrete, lumber, wire, reinforcing, debris, and other materials not incorporated in the work, from the site of the work. Clean-up shall include the removal of all excess pointing mortar materials within pipes and removal of over-size rocks and boulders left after finish grading. The contractor shall provide for the legal disposal of all waste products, debris, etc., and shall make necessary arrangements for such disposal.

11. SHOP DRAWINGS: The Contractor shall provide shop drawings as may be necessary for the prosecution of the work as required by the contract documents. The Engineer shall promptly review all shop drawings. The Engineer's approval of any shop drawing shall not release the Contractor from responsibility for deviations from the contract documents. The approval of any shop drawing which substantially deviates from the requirements of the contract documents shall be evidenced by a change order.

    When submitted for the Engineer's review, shop drawings shall bear the contractor's certification that he has reviewed, checked, and approved the shop drawings and that they are in conformance with the requirements of the contract documents.

    Portions of the work requiring a shop drawing or sample submission shall not begin until the shop drawing or sample submission has been approved by the Engineer. A copy of each approved shop drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer.

12. PROTECTION OF FINISHED OR PARTIALLY FINISHED WORK: The Contractor shall properly guard and protect all finished or partially finished work, and shall be responsible for the same until the entire contract is completed and accepted, in writing, by the City. The Contractor shall turn over the entire work in full accordance with the specifications before final settlement shall be made.

13. STATUS OF EMPLOYEES: Contractor shall be responsible for assuring the legal working status of its employees and its subcontractor's employees.

14. LAWS AND REGULATIONS: This Contract shall be governed by and constructed in accordance with the laws of the State of Arizona. The Contractor shall keep himself fully informed of all existing and future City and County Ordinances and Regulations and State and Federal Laws and Occupational Safety and Health Standards (OSHA) in any manner affecting the work herein specified. He shall at all times observe and comply with said Ordinances, Regulations, or Laws.

15. PERMITS: The City has obtained certain required permits which are included in the project specifications, but it will be the duty of the Contractor to determine that all the necessary permits have been obtained. The Contractor shall, at his own expense, obtain all required permits which have not been furnished by the City. A no-fee permit will be issued for work in the City of Glendale right-of-way and easement. (Also see Paragraph 6. Dust Prevention.)

16. ELECTRIC POWER AND WATER: The Contractor shall make his own arrangements for electric power and water. Subject to the convenience of the City, he may be permitted to connect to existing facilities where available, but he shall meter and bear the cost of such power or water. Fire hydrant meters may be obtained from the City of Glendale. Installation and removal of meters should be scheduled at least forty-eight (48) hours in advance through the Public Works/Utilities Division at 930-2700. A $325 deposit is required for each meter. The cost of the water is at the prevailing rate.

17. SURVEY CONTROL POINTS AND MONUMENTS: Existing survey monuments indicated on the plans or found during construction shall be protected by the Contractor, and in the event removal is necessary, removal and replacement shall be performed by permission of the Engineer, under direct supervision of the Engineer or his authorized representative. Survey monuments shall be constructed to conform to the requirements of MAG Specifications, Section 405, and Standard Details.

18. EXISTING UTILITIES: The Contractor is hereby advised that the location of all utilities, as shown on the plans, may not be complete nor exact and the Contractor shall satisfy himself as to the exact location of the utilities by contacting Blue Stake or the utility companies before proceeding with the work. After the underground utilities are located by Blue Stake or the utility company, the contractor shall excavate in a careful and prudent manner to prevent unwillful damage to the underground utilities.

    In the event the Contractor or its Subcontractor damages an existing, properly identified underground City of Glendale water or sewer line, the Contractor shall be responsible for the repairs at its expense.

    The exact location of all existing underground service utilities, whether or not indicated on the plans, shall be determined by the Contractor at no expense to the City, and he shall conduct his work so as to prevent interruption of service or damage to them.

    The Contractor shall protect existing utility services and be responsible for their replacement if damaged by him, or to make necessary adjustment in their location, if required, in order to complete the work for his Contract.

    Utility companies and other interested parties have been provided with construction plans and the construction schedule for this project. The Contractor shall comply with MAG Specifications 105.6 to cooperate with the utility companies.

19. MAINTENANCE OF IRRIGATION FACILITIES: Where irrigation facilities interfere with construction, the Contractor shall remove and replace the affected irrigation facilities to its original condition. Final acceptance of replaced facilities will depend upon final approval of the Engineer.

20. OVERHEAD UTILITY LINES AND POLES: Contractor is advised that when work around overhead lines and poles is required on a project the Contractor is required to coordinate with Utility Companies who own and operate overhead lines and poles. The coordination may include, but not be limited to the following activities: pole bracing, de-energizing of lines, and temporary relocations. Contractor is responsible to contact the applicable Utility Company representative and discuss his proposed construction methods; in order to determine what actions the Utility Company must take and the costs related to those actions. The Contractor shall include these costs in the

applicable bid items for this project.

The primary and the backup representatives for this review and cost determinations are as follows:

Arizona Public Service:	Mr. Bobby Garza	[redacted]
CenturyLink:	Mr. Ron Floyd	
Salt River Project:	Mr. Tim Rinn	
Salt River Project:	Ms. Mariann Ward	
Cox Communications:	Mr. Ron Pint	
Cox Communications:	Ms. Linda Facio	

21. SOUTHWEST GAS FACILITIES EXPOSED DURING CONSTRUCTION: The Contractor, upon exposing a gas line during construction, shall call SOUTHWEST GAS at 602-271-4277. The Southwest Gas patrolman will respond, usually within an hour, to inspect the line. Minor cuts or abrasions to the pipe coating will be rewrapped and tracer wire will be reconnected at no cost to the City.

22. UNDERGROUND UTILITIES' BEDDING: All water, sewer, storm drain, irrigation and other conduits installed within the City of Glendale shall be bedded from bottom of excavation to one foot above the pipe with granular bedding material meeting the requirements of Section 601.4.6 of MAG Uniform Standard Specifications. The initial bedding under the pipe is required for pipe having an inside diameter of 12 inches or larger, and in all cases where rock larger than 1-1/2" is encountered in the trench bottom.

23. SEWER SERVICE LINES: The Contractor shall be responsible for locating, and protecting from damage during construction, all sewer service lines within the project which are not owned by the City. Contractor will be permitted to review the "as-builts" to assist Contractor in locating the non-City owned sewer service lines. These 'as-builts" were prepared, and supplied to the City, by private developers or contractors who installed the non-City owned sewer service lines. Therefore, the City does not guarantee or warranty the accuracy of such "as-builts" and the contractor, as a condition for being allowed to review such "as-builts", hereby agrees to hold the City harmless for any and all damages or other expenses contractor may incur as a result of any inaccuracies or incorrect information in these "as-builts".

24. RIGHTS-OF-WAY: The City will provide rights-of-way and easements for all work specified in this Contract, and the Contractor shall not enter or occupy with man, tools, equipment or materials any private ground outside the property of the City of Glendale, Maricopa County, Arizona, without the consent of the owner of such property.

25 SUBCONTRACTS: Subcontracts shall be in accordance with, and the Contractor shall be bound by, the following provisions:

All subcontracts shall be subject to the approval of the City.

All subcontracts shall be in writing and shall provide that all work to be performed thereunder shall be performed in accordance with the terms of the Contract.

Certified copies of any and all subcontracts shall be furnished to the City Engineering

Department; however, prices may be omitted.

Subcontracts shall conform to the regulations governing employment of labor.

The subcontracting of any part of the work will in no way relieve the Contractor of his responsibility under the Contract.

26. PRE-CONSTRUCTION CONFERENCE: After completion of the Contract Documents, to include bonds, insurance and signatures, and prior to the commencement of any work on the project, the Engineer will schedule a Pre-Construction Conference. This will be held at the Glendale Municipal Airport, 6801 North Glen Harbor Boulevard., Glendale, Arizona.

The purpose of this Conference is to establish a working relationship between the Contractor, Utility Companies, and the Engineer. The agenda will include critical elements of the construction schedule, procedures for handling shop drawings and other submittals, cost breakdown of major lump sum items, payment application and processing, coordination with the involved utility companies, emergency telephone numbers for all representatives involved in the course of construction, and establishment of the Notice to Proceed date.

Minimum attendance by the Contractor shall be a responsible official of the company/corporation, who is authorized to execute and sign documents on behalf of the company/corporation.

27. OVERTIME:

Regular Work Hours: The work required to be performed by the Plans and Specifications for the Project shall be performed only during regular working hours, unless the City has authorized overtime work in accordance with the procedures set forth below. Regular working hours shall be defined as one 8-1/2 hour shift per day, Monday through Friday, or, upon prior approval of the City, one 10-1/2 hour shift per day on a compressed four day work week during Monday through Friday. Regular working hours shall not include Saturdays, Sundays or City of Glendale recognized legal holidays.

Authorization and Costs: If the Contractor desires to schedule work for times other than regular work hours (overtime), the Contractor shall make a written request to the City at least two business days prior to the scheduled overtime. The City reserves the right to deny the request to work overtime based on the best interest and needs of the City. If an overtime request is denied, the City may, at its sole discretion, extend the contract time at no additional costs to the City.

In the event the Contractor does perform work overtime, with or without the prior approval of the City, the Contractor shall be responsible to the City for all additional costs that may be incurred by the City as a result of the Contractor's overtime work, including costs for engineering, inspections, testing, surveying and construction administration, all in accordance with MAG Section 108.5. However, the Contractor shall not be responsible for City's costs incurred as a result of overtime work requested by the City or overtime work resulting from an emergency which is not the responsibility of the Contractor or its employees, subcontractors or suppliers. The City's cost will be billed directly to the Contractor or may, at the City's option, be deducted from monies due the Contractor.

28. CONTRACTOR'S CONSTRUCTION SCHEDULE: Concurrently, with the execution of the contract and prior to the pre-construction conference, the Contractor shall submit a preliminary schedule for the Engineer's review and acceptance. The schedule shall be in sufficient detail to allow the Engineer to determine if the proposed schedule will conform to an acceptable program of construction operations, as determined by the contracting agency. Within ten calendar days after the preliminary schedule, described above, has been accepted by the Engineer, the Contractor shall submit a progress schedule, utilizing the critical path method scheduling technique, showing the order in which he proposes to carry out the work, the dates on which he will start each phase of the work, and the contemplated date for completion of each phase. The Contractor shall not be permitted to commence construction until the schedule complying with this paragraph has been submitted to the City. The Contractor will not be granted any extension to the contract time or compensation for any damages as a result of the City's refusal to allow Contractor to commence construction until the critical path method progress schedule has been submitted and accepted by the Engineer.

The critical path method (CPM) scheduling technique requires a breakdown of the entire work into individual tasks and an analysis of the number of days required to perform each task. The schedule submitted to the City should highlight and identify the critical path for the project. After the work is in progress, the Contractor shall submit supplementary progress schedules, using the critical path method technique, of the progress to date and projection for completion. The supplementary progress schedules shall be submitted with each pay request in accordance with the paragraph, "Payments to Contractors," of these Supplemental General Conditions. The progress schedules shall be subject to the acceptance of the Engineer. In the event the Contractor fails to submit a supplementary progress schedule acceptable to the Engineer, the City may withhold further progress payments to the Contractor until the Contractor submits an acceptable supplementary progress schedule, which is accepted by the Engineer, to the City. Schedule changes requiring an increase in the City's engineering personnel on the project shall not be put into effect until the Engineer has approved such increase and made arrangements for the required additional personnel.

29 CHARACTER OF WORKMEN: None but skilled foremen and workmen shall be employed on work requiring special qualifications. When required by the Engineer, the Contractor shall discharge any person who is, in the opinion of the Engineer, disorderly, dangerous, insubordinate, incompetent, or otherwise objectionable. The Contractor shall keep the City harmless from damages or claims for compensation that may occur in the enforcement of this section of the specifications.

30. HINDRANCES AND DELAYS: Except as otherwise provided herein, no charge shall be made by the Contractor for hindrances or delays from any cause during the progress of the work embraced in this Contract; but such delays, if due to no fault or neglect of the Contractor, shall entitle the Contractor to an extension of time allowed for completing the work, sufficient to compensate for the delay, the amount of the delay to be determined by the Engineer, provided the Contractor shall give said Engineer immediate notice in writing of the cause of such delay.

30.1 Delay: In the event of a delay for which the City is solely responsible, which is unreasonable under the circumstances and which was not within the contemplation of City and Contractor at the time this Contract is executed, City and Contractor shall negotiate, in good faith, a payment by the City to Contractor for the expenses incurred by Contractor as a result of such delay, in accordance with the City of Glendale Engineering Department's POLICY STATEMENT FOR CALCULATING DELAYS AND DAMAGES. This provision shall

not be construed to void any provision in the contract which requires notice of delay or provides for liquidated damages. However, if the delay is the result of any act or neglect of a third party, including the architect, engineer or other contractor employed by the City, or by labor disputes, fire, unusual delay in transportation, adverse weather conditions not reasonably foreseeable, unavoidable casualties, or any causes beyond the Contractor's control, the Contractor shall not be entitled to any payments or compensation for expenses incurred as a result of such delay, but the Contract Time shall be extended by Change Order for such reasonable time as the Engineer may determine. No extension or compensation will be granted for any delay which is the result, wholly or partially, of any act or neglect of Contractor or any Subcontractor hired by Contractor.

31. LIQUIDATED DAMAGES:

31.1 Should the contractor fail to substantially complete the work under this contract within the time for completion stated in the paragraph "Time of Completion," in the Information for Bidders, then the contractor shall pay the City of Glendale, Arizona, liquidated damages, pursuant to the provisions of Section 108.9, Standard Specifications for Public Works Construction, Maricopa Association of Governments, until the work is substantially complete.

31.2 Should the contractor fail to fully and finally complete the work under this contract within the time for completion set forth in the paragraph "Time of Completion," in the Information for Bidders, even though the contractor has achieved substantial completion of the work within such time, then the contractor shall pay the City of Glendale, liquidated damages (pursuant to the provisions of Section 108.9, Standard Specifications for Public Works Construction, Maricopa Association of Governments), in an amount equal to 100% of the applicable liquidated damage rate set forth in MAG Section 108.9 for each and every calendar day of delay until the work is fully and finally complete and accepted.

31.3 The date of substantial completion shall be the date when the work is sufficiently complete, in accordance with the contract documents, so the owner can fully occupy and utilize the work or designated portion thereof for the use for which it is intended, with all the project's parts and systems operable as required by the contract documents and all the work is complete, accessible, operable, and usable by the owner for its intended purpose(s), and all parts, systems and sitework are 100% complete and cleaned for the owner's use. Only incidental corrective work and final cleaning (if required), beyond cleaning needed for the owner's full use, may remain for final completion.

31.4 Full and final completion shall be that date when all work under the project, including incidental corrective work under punch list and final cleaning, has been completed and the entire project is accepted by the owner.

32. PAYMENTS TO CONTRACTOR: The measurements of quantities and the payments to the Contractor shall be in accordance with MAG Uniform Standard Specifications for Public Works Construction, Part 100 - General Conditions, Section 109 - Measurements and Payments.

Payments will be made on the basis of itemized, monthly statements prepared by the City and signed by the Contractor. The Contractor shall submit an itemized, duly certified and approved estimate for

work completed through the last day of the preceding month in accordance with MAG Specifications, as amended by these Supplemental General Conditions. Upon approval of the pay estimate, the City will mail the check directly to the Contractor.

The pay estimate shall be accompanied by an updated progress schedule as required by these Supplemental General Conditions and a cash flow report when required by the Special Provisions. Approval of progress payments shall be conditional upon submittal of progress schedules and cash flow reports, when required, which are acceptable to the Engineer.

Upon 100% completion and acceptance of the project, and with the request for final payment, the Contractor shall complete and submit the "Contractor's Affidavit Regarding Settlement of Claims" form which is included in these specifications. Before final payment and release of retention, Contractor must arrange for its Surety to provide the City with a fully executed AIA Consent of Surety form. To avoid delays in the final payment, the Surety may send the Consent of Surety directly to the City via fax at (623) 915-2861, and mail the original to the City of Glendale Engineering Department, 5850 West Glendale Avenue, Glendale, Arizona 85301. Should any ambiguity arise between the Contract and these Conditions, the provisions of the Contract shall prevail.

33. UTILITY RELOCATION (CONTINGENT ITEM): The Utility Relocation item is provided for the purpose of encumbering funds to cover the costs of utility relocations. The amount of the contingent bid item is determined by the Engineer and not subject to individual bid pricing. All bidders shall incorporate the amount pre-entered in the bid schedule and shall reflect the same in the total amount bid for the project. It shall be understood that this contingent bid item is an estimate only. It is further understood that authorized work, if any, may be less than the pre-entered amount. The Utility relocation item will be measured and paid for based on the actual costs billed to the project by the utility company for any work that is deemed necessary by the Engineer.

***END OF SUPPLEMENTAL GENERAL CONDITIONS**

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FAA GENERAL PROVISIONS

1. DEFINITIONS: Whenever the following terms are used in these specifications, in the contract, or in any documents or other instruments pertaining to construction where these specifications govern, the intent and meaning shall be interpreted as follows:

AASHTO. The American Association of State Highway and Transportation Officials, the successor association to AASHO.

ACCESS ROAD. The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.

ADVERTISEMENT. A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

AIP. The Airport Improvement Program, a grant-in-aid program, administered by the Federal Aviation Administration.

AIR OPERATIONS AREA. For the purpose of these specifications, the term air operations area shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.

AIRPORT. Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; and airport buildings and facilities located in any of these areas, and includes a heliport.

ASTM. The American Society for Testing and Materials.

AWARD. The acceptance, by the Owner, of the successful bidder's proposal.

BIDDER. Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

BUILDING AREA. An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.

CALENDAR DAY. Every day shown on the calendar.

CHANGE ORDER. A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for the work affected by such changes. The work, covered by a change order, shall be within the scope of the contract.

CONTRACT. The written agreement covering the work to be performed. The awarded contract shall include, but is not limited to: The Advertisement; The Contract Form; The Proposal; The Performance

Bond; The Payment Bond; any required insurance certificates; The Specifications; The Plans, and any addenda issued to bidders.

CONTRACT ITEM (PAY ITEM). A specific unit of work for which a price is provided in the contract.

CONTRACT TIME. The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.

CONTRACTOR. The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.

DRAINAGE SYSTEM. The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.

ENGINEER. The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering inspection of the contract work and acting directly or through an authorized representative.

EQUIPMENT. All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.

EXTRA WORK. An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.

FAA. The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his/her duly authorized representative.

FEDERAL SPECIFICATIONS. The Federal Specifications and Standards, Commercial Item Descriptions, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government.

FORCE ACCOUNT. Force account construction work is construction that is accomplished through the use of material, equipment, labor, and supervision provided by the Owner or by another public agency pursuant to an agreement with the Owner.

INSPECTOR. An authorized representative of the Engineer assigned to make all necessary inspections and/or tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

INTENTION OF TERMS. Whenever, in these specifications or on the plans, the words "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended; and similarly, the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer, subject in each case to

the final determination of the Owner.

Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.

LABORATORY. The official testing laboratories of the Owner or such other laboratories as may be designated by the Engineer.

LIGHTING. A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

MAJOR AND MINOR CONTRACT ITEMS. A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20 percent of the total amount of the award contract. All other items shall be considered minor contract items.

MATERIALS. Any substance specified for use in the construction of the contract work.

NOTICE TO PROCEED. A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.

OWNER. The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. For AIP contracts, the term "sponsor" shall have the same meaning as the term "Owner." Where the term "Owner" is capitalized in this document, it shall mean airport owner or sponsor only.

PAVEMENT. The combined surface course, base course, and subbase course, if any, considered as a single unit.

PAYMENT BOND. The approved form of security furnished by the Contractor and his/her surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the work.

PERFORMANCE BOND. The approved form of security furnished by the Contractor and his/her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.

PLANS. The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.

PROJECT. The agreed scope of work for accomplishing specific airport development with respect to a particular airport.

PROPOSAL. The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.

PROPOSAL GUARANTY. The security furnished with a proposal to guarantee that the bidder will enter into a contract if his/her proposal is accepted by the Owner.

RUNWAY. The area on the airport prepared for the landing and takeoff of aircraft.

SPECIFICATIONS. A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.

SPONSOR. See definition above of "Owner."

STRUCTURES. Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

SUBGRADE. The soil that forms the pavement foundation.

SUPERINTENDENT. The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the Engineer, and who shall supervise and direct the construction.

SUPPLEMENTAL AGREEMENT. A written agreement between the Contractor and the Owner covering (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25 percent, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.

SURETY. The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.

TAXIWAY. For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways or aircraft parking areas.

WORK. The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.

WORKING DAY. A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least 6 hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered as working days.

2. PROPOSAL REQUIREMENTS AND CONDITIONS

2.1 ADVERTISEMENT (Notice to Contractors).

2.2 PREQUALIFICATION OF BIDDERS. Each bidder shall furnish the owner satisfactory evidence of his/her competency to perform the proposed work. Such evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, a list of equipment that would be available for the work, and a list of key personnel that would be available. In addition, each bidder shall furnish the owner satisfactory evidence of his/her financial responsibility. Such evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the Contractor's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether his/her financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect his/her (bidder's) true financial condition at the time such qualified statement or report is submitted to the Owner.

Unless otherwise specified, a bidder may submit evidence that he is prequalified with the State Highway Division and is on the current "bidder's list" of the state in which the proposed work is located. Such evidence of State Highway Division prequalification may be submitted as evidence of financial responsibility in lieu of the certified statements or reports hereinbefore specified.

Each bidder shall submit "evidence of competency" and "evidence of financial responsibility" to the Owner at the time of bid opening.

2.3 CONTENTS OF PROPOSAL FORMS. The Owner shall furnish bidders with proposal forms. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

The plans specifications, and other documents designated in the proposal form shall be considered a part of the proposal whether attached or not.

2.4 ISSUANCE OF PROPOSAL FORMS. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder should such bidder be in default for any of the following reasons:

a. Failure to comply with any prequalification regulations of the Owner, if such regulations are cited, or otherwise included, in the proposal as a requirement for bidding.

b. Failure to pay, or satisfactorily settle, all bills due for labor and materials on former contracts in force (with the Owner) at the time the Owner issues the proposal to a prospective bidder.

c. Contractor default under previous contracts with the Owner.

d. Unsatisfactory work on previous contracts with the Owner.

2.5 INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly or by implication agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the Subsection titled ALTERATION OF WORK AND QUANTITIES of this section without in any way invalidating the unit bid prices.

2.6 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans specifications, and contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract, plans, and specifications.

Boring logs and other records of subsurface investigations and tests are available for inspection of bidders. It is understood and agreed that such subsurface information, whether included in the plans, specifications, or otherwise made available to the bidder, was obtained and is intended for the Owner's design and estimating purposes only. Such information has been made available for the convenience of all bidders. It is further understood and agreed that each bidder is solely responsible for all assumptions, deductions, or conclusions which he may make or obtain from his/her examination of the boring logs and other records of subsurface investigations and tests that are furnished by the Owner.

2.7 PREPARATION OF PROPOSAL. The bidder shall submit his/her proposal on the forms furnished by the Owner. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals for which he proposes to do each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

The bidder shall sign his/her proposal correctly and in ink. If the proposal is made by an individual, his/her name and post office address must be shown. If made by a partnership, the name and post office address of each member of the partnership must be shown. If made by a corporation, the person signing the proposal shall give the name of the state under the laws of which the corporation was chartered and the name, titles, and business address of the president, secretary, and the treasurer. Anyone signing a proposal as an agent shall file evidence of his/her authority to do so and that the signature is binding upon the firm or corporation.

2.8 IRREGULAR PROPOSALS. Proposals shall be considered irregular for the following reasons:

a. If the proposal is on a form other than that furnished by the Owner, or if the Owner's form is altered, or if any part of the proposal form is detached.

b. If there are unauthorized additions, conditional or alternate pay items, or irregularities of any kind that make the proposal incomplete, indefinite, or otherwise ambiguous.

c. If the proposal does not contain a unit price for each pay item listed in the proposal, except in the case of authorized alternate pay items, for which the bidder is not required to furnish a unit price.

d. If the proposal contains unit prices that are obviously unbalanced.

e. If the proposal is not accompanied by the proposal guaranty specified by the Owner.

The Owner reserves the right to reject any irregular proposal and the right to waive technicalities if such waiver is in the best interest of the Owner and conforms to local laws and ordinances pertaining to the letting of construction contracts.

2.9 BID GUARANTEE. Each separate proposal shall be accompanied by a certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such check, or collateral, shall be made payable to the Owner.

2.10 DELIVERY OF PROPOSAL. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

2.11 WITHDRAWAL OR REVISION OF PROPOSALS. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by telegram before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

2.12 PUBLIC OPENING OF PROPOSALS. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

2.13 DISQUALIFICATION OF BIDDERS. A bidder shall be considered disqualified for any of the following reasons:

a. Submitting more than one proposal from the same partnership, firm, or corporation under the same or different name.

b. Evidence of collusion among bidders. Bidders participating in such collusion shall be disqualified as bidders for any future work of the Owner until any such participating bidder has been reinstated by the Owner as a qualified bidder.

c. If the bidder is considered to be in "default" for any reason specified in the subsection titled ISSUANCE OF PROPOSAL FORMS of this section.

3. AWARD AND EXECUTION OF CONTRACT

3.1 CONSIDERATION OF PROPOSALS. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern.

Until the award of a contract is made, the Owner reserves the right to reject a bidder's proposal for any of the following reasons:

a. If the proposal is irregular as specified in the subsection titled IRREGULAR PROPOSALS above.

b. If the bidder is disqualified for any of the reasons specified in the subsection titled DISQUALIFICATION OF BIDDERS above.

In addition, until the award of a contract is made, the Owner reserves the right to reject any or all proposals, waive technicalities, if such waiver is in the best interest of the Owner and is in conformance with applicable state and local laws or regulations pertaining to the letting of construction contracts; advertise for new proposals; or proceed with the work otherwise. All such actions shall promote the Owner's best interests.

3.2 AWARD OF CONTRACT. The award of a contract, if it is to be awarded, shall be made within 70 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

Award of the contract shall be made by the Owner to the lowest, qualified bidder whose proposal conforms to the cited requirements of the Owner.

3.3 CANCELLATION OF AWARD. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with the subsection titled APPROVAL OF CONTRACT of this section.

3.4 RETURN OF PROPOSAL GUARANTY. All proposal guaranties, except those of the three lowest bidders, will be returned immediately after the Owner has made a comparison of bids as hereinbefore specified in the subsection titled CONSIDERATION OF PROPOSALS of this section. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner

receives the contracts bonds as specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section.

3.5 REQUIREMENTS OF CONTRACT BONDS. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

3.6 EXECUTION OF CONTRACT. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return such signed contract to the owner, along with the fully executed surety bond or bonds specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder. If the contract is mailed, special handling is recommended.

3.7 APPROVAL OF CONTRACT. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

3.8 FAILURE TO EXECUTE CONTRACT. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the 15 calendar day period specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the Owner.

4. SCOPE OF WORK

4.1 INTENT OF CONTRACT. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

4.2 ALTERATION OF WORK AND QUANTITIES. The owner reserves and shall have the right to make such alterations in the work as may be necessary or desirable to complete the work originally intended in an acceptable manner. Unless otherwise specified herein, the Engineer shall be and is hereby authorized to make such alterations in the work as may increase or decrease the originally awarded contract quantities, provided that the aggregate of such alterations does not change the total contract cost or the total cost of any major contract item by more than 20 percent (total cost being based on the unit prices and estimated quantities in the awarded contract). Alterations that do not exceed the 20 percent limitation shall not invalidate the contract nor release the surety, and the Contractor agrees to accept payment for such alterations as if the altered work had been a part of the original contract. These alterations that are for work within the general scope of the contract shall be covered by "Change Orders"

issued by the Engineer. Change orders for altered work shall include extensions of contract time where, in the Engineer's opinion, such extensions are commensurate with the amount and difficulty of added work.

Should the aggregate amount of altered work exceed the 20 percent limitation hereinbefore specified, such excess altered work shall be covered by supplemental agreement. If the owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

4.3 OMITTED ITEMS. The Engineer may, in the Owner's best interest, omit from the work any contract item, except major contract items. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be nonperformed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with the subsection titled PAYMENT FOR OMITTED ITEMS.

4.4 EXTRA WORK. Should acceptable completion of the contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original contract or previously issued change orders or supplemental agreements, the same shall be called "Extra Work." Extra Work that is within the general scope of the contract shall be covered by written change order. Change orders for such Extra Work shall contain agreed unit prices for performing the change order work in accordance with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the Engineer's opinion, is necessary for completion of such Extra Work.

When determined by the Engineer to be in the Owner's best interest, he may order the Contractor to proceed with Extra Work by force account as provided in the subsection titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK.

Extra Work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a Supplemental Agreement as hereinbefore defined in the subsection titled SUPPLEMENTAL AGREEMENT.

Any claim for payment of Extra Work that is not covered by written agreement (change order or supplemental agreement) shall be rejected by the Owner.

4.5 MAINTENANCE OF TRAFFIC. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas of the airport with respect to his/her own operations and the operations of all his/her subcontractors as specified in the subsection titled LIMITATION OF OPERATIONS. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in the subsection titled CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS.

With respect to his/her own operations and the operations of all his/her subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying: personnel; equipment; vehicles; storage areas; and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, or maintenance vehicles at the airport.

When the contract requires the maintenance of vehicular traffic on an existing road, street, or highway during the Contractor's performance of work that is otherwise provided for in the contract, plans, and specifications, the Contractor shall keep such road, street, or highway open to all traffic and shall provide such maintenance as may be required to accommodate traffic. The Contractor shall furnish erect, and maintain barricades, warning signs, flag person, and other traffic control devices in reasonable conformity with the manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office), unless otherwise specified herein. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roads, streets or highways. Unless otherwise specified herein, the Contractor will not be required to furnish snow removal for such existing road, street, or highway.

The Contractor shall make his/her own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of aircraft and vehicular traffic as specified in this subsection.

The cost of maintaining the aircraft and vehicular traffic specified in this subsection shall not be measured or paid for directly, but shall be included in the various contract items.

4.6 REMOVAL OF EXISTING STRUCTURES. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Engineer shall be notified prior to disturbing such structure. The disposition of existing structures so encountered shall be immediately determined by the Engineer in accordance with the provisions of the contract.

Except as provided in the subsection titled RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK of this section, it is intended that all existing materials or structures that may be encountered (within the lines, grades, or grading sections established for completion of the work) shall be used in the work as otherwise provided for in the contract and shall remain the property of the Owner when so used in the work.

4.7 RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be either embankment or waste, he may at his/her option either:

a. Use such material in another contract item, providing such use is approved by the Engineer and is in conformance with the contract specifications applicable to such use; or,

b. Remove such material from the site, upon written approval of the Engineer; or

c. Use such material for his/her own temporary construction on site; or,

d. Use such material as intended by the terms of the contract.

Should the Contractor wish to exercise option a., b., or c., he shall request the Engineer's approval in advance of such use.

Should the Engineer approve the Contractor's request to exercise option a., b., or c., the Contractor shall be paid for the excavation or removal of such material at the applicable contract price. The Contractor shall replace, at his/her own expense, such removed or excavated material with an agreed equal volume of material that is acceptable for use in constructing embankment, backfills, or otherwise to the extent that such replacement material is needed to complete the contract work. The Contractor shall not be charged for his/her use of such material so used in the work or removed from the site.

Should the Engineer approve the Contractor's exercise of option a., the Contractor shall be paid, at the applicable contract price, for furnishing and installing such material in accordance with requirements of the contract item in which the material is used.

It is understood and agreed that the Contractor shall make no claim for delays by reason of his/her exercise of option a., b., or c.

The Contractor shall not excavate, remove, or otherwise disturb any material, structure, or part of a structure which is located outside the lines, grades, or grading sections established for the work, except where such excavation or removal is provided for in the contract, plans, or specifications.

4.8 FINAL CLEANING UP. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. He shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of such property owner.

5. CONTROL OF WORK

5.1 AUTHORITY OF THE ENGINEER. The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the work. The Engineer shall decide all questions that may arise as to the interpretation of the specifications or plans relating to the work. The Engineer shall determine the amount and quality of the several kinds of work

performed and materials furnished which are to be paid for the under contract.

The Engineer does not have the authority to accept pavements that do not conform to FAA specification requirements.

5.2 CONFORMITY WITH PLANS AND SPECIFICATIONS. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans or specifications.

If the Engineer finds the materials furnished, work performed, or the finished product not within reasonably close conformity with the plans and specifications but that the portion of the work affected will, in his/her opinion, result in a finished product having a level of safety, economy, durability, and workmanship acceptable to the Owner, he will advise the Owner of his/her determination that the affected work be accepted and remain in place. In this event, the Engineer will document his/her determination and recommend to the Owner a basis of acceptance that will provide for an adjustment in the contract price for the affected portion of the work. The Engineer's determination and recommended contract price adjustments will be based on good engineering judgment and such tests or retests of the affected work as are, in his/her opinion, needed. Changes in the contract price shall be covered by contract modifications (change order or supplemental agreement) as applicable.

If the Engineer finds the materials furnished, work performed, or the finished product are not in reasonably close conformity with the plans and specifications and have resulted in an unacceptable finished product, the affected work or materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor in accordance with the Engineer's written orders.

For the purpose of this subsection, the term "reasonably close conformity" shall not be construed as waiving the Contractor's responsibility to complete the work in accordance with the contract, plans, and specifications. The term shall not be construed as waiving the Engineer's responsibility to insist on strict compliance with the requirements of the contract, plans, and specifications during the Contractor's prosecution of the work, when, in the Engineer's opinion, such compliance is essential to provide an acceptable finished portion of the work.

For the purpose of this subsection, the term "reasonably close conformity" is also intended to provide the Engineer with the authority, after consultation with the FAA, to use good engineering judgment in his/her determinations as to acceptance of work that is not in strict conformity but will provide a finished product equal to or better than that intended by the requirements of the contract, plans and specifications.

The Engineer will not be responsible for the Contractor's means, methods, techniques, sequences, or procedures of construction or the safety precautions incident thereto.

5.3 COORDINATION OF CONTRACT, PLANS, AND SPECIFICATIONS. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of

discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited FAA advisory circulars; contract general provisions shall govern over plans, cited standards for materials or testing, and cited FAA advisory circulars; plans shall govern over cited standards for materials or testing and cited FAA advisory circulars. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

From time to time, discrepancies within cited standards for testing occur due to the timing of changing, editing, and replacing of standards. In the event the Contractor discovers any apparent discrepancy within standard test methods, he shall immediately call upon the Engineer for his/her interpretation and decision, and such decision shall be final.

The Contractor shall not take advantage of any apparent error or omission on the plans or specifications. In the event the Contractor discovers any apparent error or discrepancy, he shall immediately call upon the Engineer for his/her interpretation and decision, and such decision shall be final.

5.4 COOPERATION OF CONTRACTOR. The Contractor will be supplied with five copies each of the plans and specifications. He shall have available on the work at all times one copy each of the plans and specifications. Additional copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

The Contractor shall give constant attention to the work to facilitate the progress thereof, and he shall cooperate with the Engineer and his/her inspectors and with other contractors in every way possible. The Contractor shall have a competent superintendent on the work at all times who is fully authorized as his/her agent on the work. The superintendent shall be capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Engineer or his/her authorized representative.

5.5 COOPERATION BETWEEN CONTRACTORS. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct his/her work so as not to interfere with or hinder the progress of completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with his/her contract and shall protect and save harmless the Owner from any and all damages or claims that may arise because of inconvenience, delays, or loss experienced by him because of the presence and operations of other Contractors working within the limits of the same project.

The Contractor shall arrange his/her work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. He shall join his/her work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

5.6 DELETED

5.7 AUTOMATICALLY CONTROLLED EQUIPMENT. Whenever batching or mixing plant equipment is required to be operated automatically under the contract and a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for a period 48 hours following the breakdown or malfunction, provided this method of operations will produce results which conform to all other requirements of the contract.

5.8 AUTHORITY AND DUTIES OF INSPECTORS. Inspectors employed by the Owner shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

Inspectors employed by the Owner are authorized to notify the Contractor or his/her representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the Engineer for his/her decision.

5.9 INSPECTION OF THE WORK. All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense.

Any work done or materials used without supervision or inspection by an authorized representative of the Owner may be ordered removed and replaced at the Contractor's expense unless the Owner's representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

5.10 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the Engineer as provided in the subsection titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this section.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the subsection titled CONTRACTOR'S RESPONSIBILITY FOR WORK.

No removal work made under provision of this subsection shall be done without lines and grades having been given by the Engineer. Work done contrary to the instructions of the Engineer, work done beyond the lines shown on the plans or as given, except as herein specified, or any extra work done without authority, will be considered as unauthorized and will not be paid for under the provisions of the contract. Work so done may be ordered removed or replaced at the Contractor's expense.

Upon failure on the part of the Contractor to comply forthwith with any order of the Engineer made under the provisions of this subsection, the Engineer will have authority to cause unacceptable work to be remedied or removed and replaced and unauthorized work to be removed and to deduct the costs (incurred by the Owner) from any monies due or to become due the Contractor.

5.11 LOAD RESTRICTIONS. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

The operation of equipment of such weight or so loaded as to cause damage to structures or to any other type of construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited as directed. No loads will be permitted on a concrete pavement, base, or structure before the expiration of the curing period. The Contractor shall be responsible for all damage done by his/her hauling equipment and shall correct such damage at his/her own expense.

5.12 MAINTENANCE DURING CONSTRUCTION. The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

In the case of a contract for the placing of a course upon a course or subgrade previously constructed, the Contractor shall maintain the previous course or subgrade during all construction operations.

All costs of maintenance work during construction and before the project is accepted shall be included in the unit prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

5.13 FAILURE TO MAINTAIN THE WORK. Should the Contractor at any time fail to maintain the work as provided in the subsection titled MAINTENANCE DURING CONSTRUCTION of this section, the Engineer shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required

to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

Should the Contractor fail to respond to the Engineer's notification, the Owner may suspend any work necessary for the Owner to correct such unsatisfactory maintenance condition, depending on the exigency that exists. Any maintenance cost incurred by the Owner, shall be deducted from monies due or to become due the Contractor.

5.14 PARTIAL ACCEPTANCE. If at any time during the prosecution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, he may request the Engineer to make final inspection of that unit. If the Engineer finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, he may accept it as being completed, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

5.15 FINAL ACCEPTANCE. Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be completed in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The Engineer shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed. In such event, the Engineer will make the final acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection.

5.16 CLAIMS FOR ADJUSTMENT AND DISPUTES. If for any reason the Contractor deems that additional compensation is due him for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, he shall notify the Engineer in writing of his/her intention to claim such additional compensation before he begins the work on which he bases the claim. If such notification is not given or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit his/her written claim to the Engineer who will present it to the Owner for consideration in accordance with local laws or ordinances.

Nothing in this subsection shall be construed as a waiver of the Contractor's right to dispute final payment based on differences in measurements or computations.

5.17 COST REDUCTION INCENTIVE. The provisions of this subsection will apply only to contracts awarded to the lowest bidder pursuant to competitive bidding.

On projects with original contract amounts in excess of $100,000, the Contractor may submit to the Engineer, in writing, proposals for modifying the plans, specifications or other requirements of the contract for the sole purpose of reducing the cost of construction. The cost reduction proposal shall not impair, in any manner, the essential functions or characteristics of the project, including but not limited to service life, economy of operation, ease of maintenance, desired appearance, design and safety standards. This provision shall not apply unless the proposal submitted is specifically identified by the Contractor as being presented for consideration as a value engineering proposal.

Not eligible for cost reduction proposals are changes in the basic design of a pavement type, runway and taxiway lighting, visual aids, hydraulic capacity of drainage facilities, or changes in grade or alignment that reduce the geometric standards of the project.

As a minimum, the following information shall be submitted by the Contractor with each proposal:

a. A description of both existing contract requirements for performing the work and the proposed changes, with a discussion of the comparative advantages and disadvantages of each;
b. An itemization of the contract requirements that must be changed if the proposal is adopted;
c. A detailed estimate of the cost of performing the work under the existing contract and under the proposed changes;
d. A statement of the time by which a change order adopting the proposal must be issued;
e. A statement of the effect adoption of the proposal will have on the time for completion of the contract; and
f. The contract items of work affected by the proposed changes, including any quantity variation attributable to them.

The Contractor may withdraw, in whole or in part, any cost reduction proposal not accepted by the Engineer, within the period specified in the proposal. The provisions of this subsection shall not be construed to require the Engineer to consider any cost reduction proposal that may be submitted.

The Contractor shall continue to perform the work in accordance with the requirements of the contract until a change order incorporating the cost reduction proposal has been issued. If a change order has not been issued by the date upon which the Contractor's cost reduction proposal specifies that a decision should be made, or such other date as the Contractor may subsequently have requested in writing, such cost reduction proposal shall be deemed rejected.

The Engineer shall be the sole judge of the acceptability of a cost reduction proposal and of the estimated net savings from the adoption of all or any part of such proposal. In determining the estimated net savings, the Engineer may disregard the contract bid prices if, in the Engineer's judgment such prices do not represent a fair measure of the value of the work to be performed or deleted.

The Owner may require the Contractor to share in the Owner's costs of investigating a cost reduction proposal submitted by the Contractor as a condition of considering such proposal. Where such a condition is imposed, the Contractor shall acknowledge acceptance of it in writing. Such acceptance shall constitute full authority for the Owner to deduct the cost of investigating a cost reduction proposal from amounts payable to the Contractor under the contract.

If the Contractor's cost reduction proposal is accepted in whole or in part, such acceptance will be by a contract change order that shall specifically state that it is executed pursuant to this subsection. Such change order shall incorporate the changes in the plans and specifications which are necessary to permit the cost reduction proposal or such part of it as has been accepted and shall include any conditions upon which the Engineer's approval is based. The change order shall also set forth the estimated net savings attributable to the cost reduction proposal. The net savings shall be determined as the difference in costs between the original contract costs for the involved work items and the costs occurring as a result of the proposed change. The change order shall also establish the net savings agreed upon and shall provide for adjustment in the contract price that will divide the net savings equally between the Contractor and the Owner.

The Contractor's 50 percent share of the net savings shall constitute full compensation to the Contractor for the cost reduction proposal and the performance of the work.

Acceptance of the cost-reduction proposal and performance of the cost-reduction work shall not extend the time of completion of the contract unless specifically provided for in the contract change order.

6. CONTROL OF MATERIALS

6.1 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS. The materials used on the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

In order to expedite the inspection and testing of materials, the Contractor shall furnish complete statements to the Engineer as to the origin, composition, and manufacture of all materials to be used in the work. Such statements shall be furnished promptly after execution of the contract but, in all cases, prior to delivery of such materials.

At the Engineer's option, materials may be approved at the source of supply before delivery is stated. If it is found after trial that sources of supply for previously approved materials do not produce specified products, the Contractor shall furnish materials from other sources.

The Contractor shall furnish airport lighting equipment that conforms to the requirements of cited materials specifications. In addition, where an FAA specification for airport lighting equipment is cited in the plans or specifications, the Contractor shall furnish such equipment that is:

a. Listed in FAA Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program, and Addendum that is in effect on the date of advertisement; and,

b. Produced by the manufacturer as listed in the Addendum cited above for the certified equipment part number.

The following airport lighting equipment is required for this contract and is to be furnished by the Contractor in accordance with the requirements of this subsection:

EQUIPMENT NAME
CITED FAA SPECIFICATIONS
EFFECTIVE FAA AC OR APPROVAL LETTER FOR EQUIPMENT AND MANUFACTURER

6.2 SAMPLES, TESTS, AND CITED SPECIFICATIONS. Unless otherwise designated, all materials used in the work shall be inspected, tested, and approved by the Engineer before incorporation in the work. Any work in which untested materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Engineer, shall be removed at the Contractor's expense.

Unless otherwise designated, tests in accordance with the cited standard methods of ASTM, AASHTO, Federal Specifications, Commercial Item Descriptions, and all other cited methods, which are current on the date of advertisement for bids, will be made by and at the expense of the Engineer.

The testing organizations performing on site field tests shall have copies of all referenced standards on the construction site for use by all technicians and other personnel, including the Contractor's representative at his/her request. Unless otherwise designated, samples will be taken by a qualified representative of the Engineer. All materials being used are subject to inspection, test, or rejection at any time prior to or during incorporation into the work. Copies of all tests will be furnished to the Contractor's representative at his/her request.

The Contractor shall employ a testing organization to perform all Contractor required tests. The Contractor shall submit to the Engineer resumes on all testing organizations and individual persons who will be performing the tests. The Engineer will determine if such persons are qualified. All the test data shall be reported to the Engineer after the results are known. A legible, handwritten copy of all test data shall be given to the Engineer daily, along with printed reports, in an approved format, on a weekly basis. After completion of the project, and prior to final payment, the Contractor shall submit a final report to the Engineer showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

6.3 CERTIFICATION OF COMPLIANCE. The Engineer may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

Materials or assemblies used on the basis of certificates of compliance may be sampled and

tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

The form and distribution of certificates of compliance shall be as approved by the Engineer.

When a material or assembly is specified by "brand name or equal" and the Contractor elects to furnish the specified "brand name," the Contractor shall be required to furnish the manufacturer's certificate of compliance for each lot of such material or assembly delivered to the work. Such certificate of compliance shall clearly identify each lot delivered and shall certify as to:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and,

b. Suitability of the material or assembly for the use intended in the contract work.

Should the Contractor propose to furnish an "or equal" material or assembly, he shall furnish the manufacturer's certificates of compliance as hereinbefore described for the specified brand name material or assembly. However, the Engineer shall be the sole judge as to whether the proposed "or equal" is suitable for use in the work.

The Engineer reserves the right to refuse permission for use of materials or assemblies on the basis of certificates of compliance.

6.4 PLANT INSPECTION. The Engineer or his/her authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for his/her acceptance of the material or assembly.

Should the Engineer conduct plant inspections, the following conditions shall exist:

a. The Engineer shall have the cooperation and assistance of the Contractor and the producer with whom he has contracted for materials.

b. The Engineer shall have full entry at all reasonable times to such parts of the plant that concern the manufacture or production of the materials being furnished.

c. If required by the Engineer, the Contractor shall arrange for adequate office or working space that may be reasonably needed for conducting plant inspections. Office or working space should be conveniently located with respect to the plant.

It is understood and agreed that the Owner shall have the right to retest any material that has been tested and approved at the source of supply after it has been delivered to the site. The Engineer shall have the right to reject only material which, when retested, does not meet the requirements of the contract, plans, or specifications.

6.5 DELETED.

6.6 STORAGE OF MATERIALS. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Engineer. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the Engineer. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Engineer a copy of the property owner's permission.

All storage sites on private or airport property shall be restored to their original condition by the Contractor at his/her entire expense, except as otherwise agreed to (in writing) by the owner or lessee of the property.

6.7 UNACCEPTABLE MATERIALS. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the Engineer.

Rejected material or assembly, the defects of which have been corrected by the Contractor, shall not be returned to the site of the work until such time as the Engineer has approved its used in the work.

6.8 OWNER FURNISHED MATERIALS. The Contractor shall furnish all materials required to complete the work, except those specified herein (if any) to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified herein.

All costs of handling, transportation from the specified location to the site of work, storage, and installing Owner-furnished materials shall be included in the unit price bid for the contract item in which such Owner-furnished material is used.

After any Owner-furnished material has been delivered to the location specified, the Contractor shall be responsible for any demurrage, damage, loss, or other deficiencies that may occur during the Contractor's handling, storage, or use of such Owner-furnished material. The Owner will deduct from any monies due or to become due the Contractor any cost incurred by the Owner in making good such loss due to the Contractor's handling, storage, or use of Owner-furnished materials.

7. LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

7.1 LAWS TO BE OBSERVED. The Contractor shall keep fully informed of all Federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all his/her officers, agents, or servants against any

claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his/her employees.

7.2 PERMITS, LICENSES, AND TAXES. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work. There will be no charge to the Contractor for any permits issued by the City.

7.3 PATENTED DEVICES, MATERIALS, AND PROCESSES. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the surety shall indemnify and save harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the prosecution or after the completion of the work.

7.4 RESTORATION OF SURFACES DISTURBED BY OTHERS. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) is indicated as follows:

Owner (Utility or Other Facility)

Location (See Plan Sheet No.)

Person to Contact (Name, Title, Address and Phone)

Except as listed above, the Contractor shall not permit any individual, firm, or corporation to excavate or otherwise disturb such utility services or facilities located within the limits of the work without the written permission of the Engineer.

Should the owner of public or private utility service, FAA, or NOAA facility, or a utility service of another government agency be authorized to construct, reconstruct, or maintain such utility service or facility during the progress of the work, the Contractor shall cooperate with such owners by arranging and performing the work in this contract so as to facilitate such construction, reconstruction or maintenance by others whether or not such work by others is listed above. When ordered as extra work by the Engineer, the Contractor shall make all necessary repairs to the work which are due to such authorized work by others, unless otherwise provided for in the contract, plans, or specifications. It is understood and agreed that the Contractor shall not be entitled to make any claim for damages due to such authorized work by others or for any delay to the work resulting from such authorized work.

7.5 FEDERAL AID PARTICIPATION. For AIP contracts, the United States Government has agreed to reimburse the Owner for some portion of the contract costs. Such reimbursement is made from time to time upon the Owner's request to the FAA. In consideration of the United

States Government's (FAA's) agreement with the Owner, the Owner has included provisions in this contract pursuant to the requirements of Title 49 of the United States Code (USC) and the Rules and Regulations of the FAA that pertain to the work.

As required by the USC, the contract work is subject to the inspection and approval of duly authorized representatives of the Administrator, FAA, and is further subject to those provisions of the rules and regulations that are cited in the contract, plans, or specifications.

No requirement of the USC, the rules and regulations implementing the USC, or this contract shall be construed as making the Federal Government a party to the contract nor will any such requirement interfere, in any way, with the rights of either party to the contract.

7.6 SANITARY, HEALTH, AND SAFETY PROVISIONS. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his/her employees as may be necessary to comply with the requirements of the state and local Board of Health, or of other bodies or tribunals having jurisdiction.

Attention is directed to Federal, state, and local laws, rules and regulations concerning construction safety and health standards. The Contractor shall not require any worker to work in surroundings or under conditions that are unsanitary, hazardous, or dangerous to his/her health or safety.

7.7 PUBLIC CONVENIENCE AND SAFETY. The Contractor shall control his/her operations and those of his/her subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to his/her own operations and those of his/her subcontractors and all suppliers in accordance with the subsection titled MAINTENANCE OF TRAFFIC of this section hereinbefore specified and shall limit such operations for the convenience and safety of the traveling public as specified in the subsection titled LIMITATION OF OPERATIONS hereinafter.

7.8 BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS. The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated. Unless otherwise specified, barricades, warning signs, and markings for hazards that are in the air operations area shall be a maximum of 18 in high. Unless otherwise specified, barricades shall be spaced not more than 10 feet apart. Barricades, warning signs, and markings shall be paid for under Traffic Control & Barricading.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).

When the work requires closing an air operations area of the airport or portion of such area, the Contractor shall furnish, erect, and maintain temporary markings and associated lighting conforming to the requirements of AC 150/5340-1, Standards for Airport Markings.

The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stock piles, and his/her parked construction equipment that may be hazardous to the operation of emergency fire-rescue or maintenance vehicles on the airport in reasonable conformance to AC 150/5370-2, Operational Safety on Airports During Construction.

The Contractor shall identify each motorized vehicle or piece of construction equipment in reasonable conformance to AC 150/5370-2.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work that requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their dismantling is directed by the Engineer.

Open-flame type lights shall not be permitted within the air operations areas of the airport.

7.9 USE OF EXPLOSIVES. When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.

All explosives shall be stored in a secure manner in compliance with all laws and ordinances, and all such storage places shall be clearly marked. Where no local laws or ordinances apply, storage shall be provided satisfactory to the Engineer and, in general, not closer than 1,000 feet (300 m) from the work or from any building, road, or other place of human occupancy.

The Contractor shall notify each property owner and public utility company having structures or facilities in proximity to the site of the work of his/her intention to use explosives. Such notice shall be given sufficiently in advance to enable them to take such steps as they may deem necessary to protect their property from injury.

The use of electrical blasting caps shall not be permitted on or within 1,000 feet (300 m) of the airport property.

7.10 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

The Contractor shall be responsible for all damage or injury to property of any character, during the prosecution of the work, resulting from any act, omission, neglect, or misconduct in his/her manner or method of executing the work, or at any time due to defective work or materials, and said responsibility will not be released until the project shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, he shall restore, at his/her own

expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or he shall make good such damage or injury in an acceptable manner.

7.11 RESPONSIBILITY FOR DAMAGE CLAIMS. The Contractor shall indemnify and save harmless the Engineer and the Owner and their officers, and employees from all suits actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the "Workmen's Compensation Act," or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of his/her contract as may be considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, his/her surety may be held until such suits, actions, or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he is adequately protected by public liability and property damage insurance.

7.12 THIRD PARTY BENEFICIARY CLAUSE. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create the public or any member thereof a third party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

7.13 OPENING SECTIONS OF THE WORK TO TRAFFIC. Should it be necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such "phasing" of the work shall be specified herein and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his/her own estimate of the difficulties involved in arranging his/her work to permit such beneficial occupancy by the Owner as described below:

Phase or Description

Required Date or Sequence of Owner's Beneficial Occupancy

Work Shown on Plan Sheet

Upon completion of any portion of the work listed above, such portion shall be accepted by the Owner in accordance with the subsection titled PARTIAL ACCEPTANCE of this section.

No portion of the work may be opened by the Contractor for public use until ordered by the Engineer in writing. Should it become necessary to open a portion of the work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Engineer, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not

constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at his/her expense.

The Contractor shall make his/her own estimate of the inherent difficulties involved in completing the work under the conditions herein described and shall not claim any added compensation by reason of delay or increased cost due to opening a portion of the contract work.

Contractor shall be required to conform to safety standards contained AC 150/5370-2, Operational Safety on Airports During Construction (See Special Provisions.)

Contractor shall refer to the approved safety plan to identify barricade requirements and other safety requirements prior to opening up sections of work to traffic.

7.14 CONTRACTOR'S RESPONSIBILITY FOR WORK. Until the Engineer's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with the subsection titled PARTIAL ACCEPTANCE of this section, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

If the work is suspended for any cause whatever, the Contractor shall be responsible for the work and shall take such precautions necessary to prevent damage to the work. The Contractor shall provide for normal drainage and shall erect necessary temporary structures, signs, or other facilities at his/her expense. During such period of suspension of work, the Contractor shall properly and continuously maintain in an acceptable growing condition all living material in newly established planting, seedings, and soddings furnished under his/her contract, and shall take adequate precautions to protect new tree growth and other important vegetative growth against injury.

7.15 CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS. As provided in the subsection titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control his/her operations to prevent the unscheduled interruption of such utility services and facilities.

To the extent that such public or private utility services, FAA, or NOAA facilities, or utility services of another governmental agency are known to exist within the limits of the contract work, the approximate locations have been indicated on the plans and the owners are indicated as follows:

Utility Service or Facility

Person to Contract (Name, Title, Address, & Phone)

Owner's Emergency Contact (Phone)

It is understood and agreed that the Owner does not guarantee the accuracy or the completeness of the location information relating to existing utility services, facilities, or structures that may be shown on the plans or encountered in the work. Any inaccuracy or omission in such information shall not relieve the Contractor of his/her responsibility to protect such existing features from damage or unscheduled interruption of service.

It is further understood and agreed that the Contractor shall, upon execution of the contract, notify the owners of all utility services or other facilities of his/her plan of operations. Such notification shall be in writing addressed to THE PERSON TO CONTACT as provided hereinbefore in this subsection and the subsection titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section. A copy of each notification shall be given to the Engineer.

In addition to the general written notification hereinbefore provided, it shall be the responsibility of the Contractor to keep such individual owners advised of changes in his/her plan of operations that would affect such owners.

Prior to commencing the work in the general vicinity of an existing utility service or facility, the Contractor shall again notify each such owner of his/her plan of operation. If, in the Contractor's opinion, the owner's assistance is needed to locate the utility service or facility or the presence of a representative of the owner is desirable to observe the work, such advice should be included in the notification. Such notification shall be given by the most expeditious means to reach the utility owner's PERSON TO CONTACT no later than two normal business days prior to the Contractor's commencement of operations in such general vicinity. The Contractor shall furnish a written summary of the notification to the Engineer.

The Contractor's failure to give the two day's notice hereinabove provided shall be cause for the Owner to suspend the Contractor's operations in the general vicinity of a utility service or facility.

Where the outside limits of an underground utility service have been located and staked on the ground, the Contractor shall be required to use excavation methods acceptable to the Engineer within 3 feet (90 cm) of such outside limits at such points as may be required to ensure protection from damage due to the Contractor's operations.

Should the Contractor damage or interrupt the operation of a utility service or facility by accident or otherwise, he shall immediately notify the proper authority and the Engineer and shall take all reasonable measures to prevent further damage or interruption of service. The Contractor, in such events, shall cooperate with the utility service or facility owner and the Engineer continuously until such damage has been repaired and service restored to the satisfaction of the utility or facility owner.

The Contractor shall bear all costs of damage and restoration of service to any utility service or facility due to his/her operations whether or not due to negligence or accident. The Owner reserves the right to deduct such costs from any monies due or which may become due the Contractor, or his/her surety.

7.16 FURNISHING RIGHTS-OF-WAY. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

7.17 PERSONAL LIABILITY OF PUBLIC OFFICIALS. In carrying out any of the contract provisions or in exercising any power or authority granted to him by this contract, there shall be no liability upon the Engineer, his/her authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

7.18 NO WAIVER OF LEGAL RIGHTS. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or his/her surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his/her obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

The Contractor, without prejudice to the terms of the contract, shall be liable to the Owner for latent defects, fraud, or such gross mistakes as may amount to fraud, or as regards the owner's rights under any warranty or guaranty.

7.19 ENVIRONMENTAL PROTECTION. The Contractor shall comply with all Federal, state, and local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

7.20 ARCHAEOLOGICAL AND HISTORICAL FINDINGS. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

Should the Contractor encounter, during his/her operations, any building, part of a building, structure, or object that is incongruous with its surroundings, he shall immediately cease operations in that location and notify the Engineer. The Engineer will immediately investigate the Contractor's finding and the Owner will direct the Contractor to either resume his/her operations or to suspend operations as directed.

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract modification (change order or supplemental agreement) as provided in the subsection titled EXTRA WORK of this section and the subsection titled PAYMENT FOR EXTRA WORK AND FORCE ACCOUNT WORK of this section. If

appropriate, the contract modification shall include an extension of contract time in accordance with the subsection titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this section.

8. PROSECUTION AND PROGRESS

8.1 SUBLETTING OF CONTRACT. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Engineer.

Should the Contractor elect to assign his/her contract, said assignment shall be concurred in by the surety, shall be presented for the consideration and acceptance of the Owner, and shall be consummated only on the written acceptance of the Owner. In case of acceptance, the Contractor shall file copies of all subcontracts with the Engineer.

The Contractor shall perform, with his organization, an amount of work equal to at least 50 percent of the total contract cost.

8.2 NOTICE TO PROCEED. The notice to proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the work to be performed under the contract within 10 days of the date set by the Engineer in the written notice to proceed, but in any event, the Contractor shall notify the Engineer at least 24 hours in advance of the time actual construction operations will begin.

8.3 PROSECUTION AND PROGRESS. Unless otherwise specified, the Contractor shall submit his/her progress schedule for the Engineer's acceptance within 10 days after the effective date of the notice to proceed. The Contractor's progress schedule, when accepted by the Engineer, may be used to establish major construction operations and to check on the progress of the work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

If the Contractor falls significantly behind the submitted schedule, the Contractor shall, upon the Engineer's request, submit a revised schedule for completion of the work within the contract time and modify his/her operations to provide such additional materials, equipment, and labor necessary to meet the revised schedule. Should the prosecution of the work be discontinued for any reason, the Contractor shall notify the Engineer at least 24 hours in advance of resuming operations.

For AIP contracts, the Contractor shall not commence any actual construction prior to the date on which the notice to proceed is issued by the Owner.

8.4 LIMITATION OF OPERATIONS. The Contractor shall control his/her operations and the operations of his/her subcontractors and all suppliers so as to provide for the free and unobstructed movement of aircraft in the AIR OPERATIONS AREAS (AOA) of the airport.

When the work requires the Contractor to conduct his/her operations within an AOA of the airport, the work shall be coordinated with airport operations (through the Engineer) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the Engineer and until the necessary temporary marking and associated lighting is in place as provided in the subsection titled BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS of Section 7.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as hereinafter specified; immediately obey all instructions to vacate the AOA; immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the AOA until the satisfactory conditions are provided. The following AOA cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

Runway 1-19: Night time closures between 8:30 P.M., and 5:30 A.M.

Contractor shall be required to conform to safety standards contained in AC 150/5370-2, Operational Safety on Airports During Construction (See Special Provisions).

8.4-1. OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION. All Contractors' operations shall be conducted in accordance with the project safety plan and the provisions set forth within the current version of Advisory Circular 150/5370-2. The safety plan included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a plan that details how it proposes to comply with the requirements presented within the safety plan.

The Contractor shall implement all necessary safety plan measures prior to commencement of any work activity. The Contractor shall conduct routine checks of the safety plan measures to assure compliance with the safety plan measures.

The Contractor is responsible to the Owner for the conduct of all subcontractors it employs on the project. The Contractor shall assure that all subcontractors are made aware of the requirements of the safety plan and that they implement and maintain all necessary measures.

No deviation or modifications may be made to the approved safety plan unless approved in writing by the Owner or Engineer.

8.5 CHARACTER OF WORKERS, METHODS, AND EQUIPMENT. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

All workers shall have sufficient skill and experience to perform properly the work assigned to them. Workers engaged in special work or skilled work shall have sufficient experience in such work and in the operation of the equipment required to perform the work satisfactorily.

Any person employed by the Contractor or by any subcontractor who violates any operational regulations and, in the opinion of the Engineer, does not perform his work in a proper and skillful manner or is intemperate or disorderly shall, at the written request of the Engineer, be removed forthwith by the Contractor or subcontractor employing such person, and shall not be employed again in any portion of the work without approval of the Engineer.

Should the Contractor fail to remove such persons or person, or fail to furnish suitable and sufficient personnel for the proper prosecution of the work, the Engineer may suspend the work by written notice until compliance with such orders.

All equipment that is proposed to be used on the work shall be of sufficient size and in such mechanical condition as to meet requirements of the work and to produce a satisfactory quality of work. Equipment used on any portion of the work shall be such that no injury to previously completed work, adjacent property, or existing airport facilities will result from its use.

When the methods and equipment to be used by the Contractor in accomplishing the work are not prescribed in the contract, the Contractor is free to use any methods or equipment that will accomplish the work in conformity with the requirements of the contract, plans, and specifications.

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of equipment other than specified in the contract, he may request authority from the Engineer to do so. The request shall be in writing and shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the contract items involved nor in contract time as a result of authorizing a change in methods or equipment under this subsection.

8.6 TEMPORARY SUSPENSION OF THE WORK. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Engineer's order to suspend work to the effective date of the Engineer's order to resume the work. Claims for such compensation shall be filed with the Engineer within the time period stated in the Engineer's order to resume work. The Contractor shall submit with his/her claim information substantiating the amount

shown on the claim. The Engineer will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the Owner, or for any other delay provided for in the contract, plans, or specifications.

If it should become necessary to suspend work for an indefinite period, the Contractor shall store all materials in such manner that they will not become an obstruction nor become damaged in any way. He shall take every precaution to prevent damage or deterioration of the work performed and provide for normal drainage of the work. The Contractor shall erect temporary structures where necessary to provide for traffic on, to, or from the airport.

8.7 DETERMINATION AND EXTENSION OF CONTRACT TIME. The number of calendar or working days allowed for completion of the work shall be stated in the proposal and contract and shall be known as the CONTRACT TIME.

Should the contract time require extension for reasons beyond the Contractor's control, it shall be adjusted as follows:

a. CONTRACT TIME based on CALENDAR DAYS shall consist of the number of calendar days stated in the contract counting from the effective date of the notice to proceed and including all Saturdays, Sundays, holidays, and nonwork days. All calendar days elapsing between the effective dates of the Owner's orders to suspend and resume all work, due to causes not the fault of the Contractor, shall be excluded.

   At the time of final payment, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in the contract time shall not consider either cost of work or the extension of contract time that has been covered by a change order or supplemental agreement. Charges against the contract time will cease as of the date of final acceptance.

8.8 FAILURE TO COMPLETE ON TIME. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in the subsection titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Section) the sum specified in the contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his/her surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in his/her contract.

Permitting the Contractor to continue and finish the work or any part of it after the time fixed for its completion, or after the date to which the time for completion may have been extended, will in no way operate as a wavier on the part of the Owner of any of its rights under the contract.

8.9 DEFAULT AND TERMINATION OF CONTRACT. The Contractor shall be considered in default of his/her contract and such default will be considered as cause for the Owner to

terminate the contract for any of the following reasons if the Contractor:

a. Fails to begin the work under the contract within the time specified in the "Notice to Proceed," or

b. Fails to perform the work or fails to provide sufficient workers, equipment or materials to assure completion of work in accordance with the terms of the contract, or

c. Performs the work unsuitably or neglects or refuses to remove materials or to perform anew such work as may be rejected as unacceptable and unsuitable, or

d. Discontinues the prosecution of the work, or

e. Fails to resume work which has been discontinued within a reasonable time after notice to do so, or

f. Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency, or

g. Allows any final judgment to stand against him unsatisfied for a period of 10 days, or

h. Makes an assignment for the benefit of creditors, or

i. For any other cause whatsoever, fails to carry on the work in an acceptable manner.

Should the Engineer consider the Contractor in default of the contract for any reason hereinbefore, he shall immediately give written notice to the Contractor and the Contractor's surety as to the reasons for considering the Contractor in default and the Owner's intentions to terminate the contract.

If the Contractor or surety, within a period of 10 days after such notice, does not proceed in accordance therewith, then the Owner will, upon written notification from the Engineer of the facts of such delay, neglect, or default and the Contractor's failure to comply with such notice, have full power and authority without violating the contract, to take the prosecution of the work out of the hands of the Contractor. The Owner may appropriate or use any or all materials and equipment that have been mobilized for use in the work and are acceptable and may enter into an agreement for the completion of said contract according to the terms and provisions thereof, or use such other methods as in the opinion of the Engineer will be required for the completion of said contract in an acceptable manner.

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

8.10 TERMINATION FOR NATIONAL EMERGENCIES. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to

the prosecution of war or in the interest of national defense.

When the contract, or any portion thereof, is terminated before completion of all items of work in the contract, payment will be made for the actual number of units or items of work completed at the contract price or as mutually agreed for items of work partially completed or not started. No claims or loss of anticipated profits shall be considered.

Reimbursement for organization of the work, and other overhead expenses, (when not otherwise included in the contract) and moving equipment and materials to and from the job will be considered, the intent being that an equitable settlement will be made with the Contractor.

Acceptable materials, obtained or ordered by the Contractor for the work and that are not incorporated in the work shall, at the option of the Contractor, be purchased from the Contractor at actual cost as shown by receipted bills and actual cost records at such points of delivery as may be designated by the Engineer.

Termination of the contract or a portion thereof shall neither relieve the Contractor of his/her responsibilities for the completed work nor shall it relieve his/her surety of its obligation for and concerning any just claim arising out of the work performed.

8.11 WORK AREA, STORAGE AREA AND SEQUENCE OF OPERATIONS. The Contractor shall obtain approval from the Engineer prior to beginning any work in all areas of the airport. No operating runway, taxiway, or Air Operations Area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his/her work in such a manner as to insure safety and a minimum of hindrance to flight operations. All Contractor equipment and material stockpiles shall be stored a minimum or 400 feet from the centerline of an active runway. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within 250 feet of an active runway at any time.

9. MEASUREMENT AND PAYMENT

9.1 MEASUREMENT OF QUANTITIES. All work completed under the contract will be measured by the Engineer, or his/her authorized representatives, using United States Customary Units of Measurement or the International System of Units.

The method of measurement and computations to be used in determination of quantities of material furnished and of work performed under the contract will be those methods generally recognized as conforming to good engineering practice.

Unless otherwise specified, longitudinal measurements for area computations will be made horizontally, and no deductions will be made for individual fixtures (or leave-outs) having an area of 9 sq ft (0.8 square meter) or less. Unless otherwise specified, transverse measurements for area computations will be the neat dimensions shown on the plans or ordered in writing by the Engineer.

Structures will be measured according to neat lines shown on the plans or as altered to fit field conditions.

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.
In computing volumes of excavation the average end area method or other acceptable methods will be used.

The thickness of plates and galvanized sheet used in the manufacture of corrugated metal pipe, metal plate pipe culverts and arches, and metal cribbing will be specified and measured in decimal fraction of in.

The term "ton" will mean the short ton consisting of 2,000 lb (907 km) avoirdupois. All materials that are measured or proportioned by weights shall be weighed on accurate, approved scales by competent, qualified personnel at locations designed by the Engineer. If material is shipped by rail, the car weight may be accepted provided that only the actual weight of material is paid for. However, car weights will not be acceptable for material to be passed through mixing plants. Trucks used to haul material being paid for by weight shall be weighed empty daily at such times as the Engineer directs, and each truck shall bear a plainly legible identification mark.

Materials to be measured by volume in the hauling vehicle shall be hauled in approved vehicles and measured therein at the point of delivery. Vehicles for this purpose may be of any size or type acceptable to the Engineer, provided that the body is of such shape that the actual contents may be readily and accurately determined. All vehicles shall be loaded to at least their water level capacity, and all loads shall be leveled when the vehicles arrive at the point of delivery.

When requested by the Contractor and approved by the Engineer in writing, material specified to be measured by the cubic yard (cubic meter) may be weighed, and such weights will be converted to cubic yards (cubic meters) for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities is used.

Bituminous materials will be measured by the gallon (liter) or ton (kg). When measured by volume, such volumes will be measured at 60 °F (15 °C) or will be corrected to the volume at 60 °F (15 °C) using ASTM D 1250 for asphalts or ASTM D 633 for tars.

Net certified scale weights or weights based on certified volumes in the case of rail shipments will be used as a basis of measurement, subject to correction when bituminous material has been lost from the car or the distributor, wasted, or otherwise not incorporated in the work.

When bituminous materials are shipped by truck or transport, net certified weights by volume, subject to correction for loss or foaming, may be used for computing quantities.

Cement will be measured by the ton (kg) or hundredweight (km).

Timber will be measured by the thousand feet board measure (MFBM) actually incorporated in the structure. Measurement will be based on nominal widths and thicknesses and the extreme length of each piece.

The term "lump sum" when used as an item of payment will mean complete payment for the work described in the contract.

When a complete structure or structural unit (in effect, "lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

Rental of equipment will be measured by time in hours of actual working time and necessary traveling time of the equipment within the limits of the work. Special equipment ordered by the Engineer in connection with force account work will be measured as agreed in the change order or supplemental agreement authorizing such force account work as provided in the subsection titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of this section.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

Scales for weighing materials which are required to be proportioned or measured and paid for by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales.

Scales shall be accurate within one-half percent of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of 1 percent of the nominal rated capacity of the scale, but not less than 1 pound (454 grams). The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and the inspector can safely and conveniently view them.

Scale installations shall have available ten standard 50-pound (2.3 km) weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end.

Scales "overweighing" (indicating more than correct weight) will not be permitted to operate, and all materials received subsequent to the last previous correct weighting-accuracy test will be reduced by the percentage of error in excess of one-half of 1 percent.

In the event inspection reveals the scales have been underweighing (indicating less than correct weight), they shall be adjusted, and no additional payment to the Contractor will be allowed for materials previously weighed and recorded.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales;

for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.

When the estimated quantities for a specific portion of the work are designated as the pay quantities in the contract, they shall be the final quantities for which payment for such specific portion of the work will be made, unless the dimensions of said portions of the work shown on the plans are revised by the Engineer. If revised dimensions result in an increase or decrease in the quantities of such work, the final quantities for payment will be revised in the amount represented by the authorized changes in the dimensions.

9.2 SCOPE OF PAYMENT. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of the subsection titled NO WAIVER OF LEGAL RIGHTS of this section.

When the "basis of payment" subsection of a technical specification requires that the contract price (price bid) include compensation for certain work or material essential to the item, this same work or material will not also be measured for payment under any other contract item which may appear elsewhere in the contract, plans, or specifications.

9.3 COMPENSATION FOR ALTERED QUANTITIES. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in the subsection titled ALTERATION OF WORK AND QUANTITIES of this section will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from his/her unbalanced allocation of overhead and profit among the contract items, or from any other cause.

9.4 PAYMENT FOR OMITTED ITEMS. As specified in the subsection titled OMITTED ITEMS of this section, the Engineer shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

Should the Engineer omit or order nonperformance of a contract item or portion of such item from the work, the Contractor shall accept payment in full at the contract prices for any work actually completed and acceptable prior to the Engineer's order to omit or nonperform such contract item.

Acceptable materials ordered by the Contractor or delivered on the work prior to the date of the Engineer's order will be paid for at the actual cost to the Contractor and shall thereupon become the property of the Owner.

In addition to the reimbursement hereinbefore provided, the Contractor shall be reimbursed for all actual costs incurred for the purpose of performing the omitted contract item prior to the date of the Engineer's order. Such additional costs incurred by the Contractor must be directly related to the deleted contract item and shall be supported by certified statements by the Contractor as to the nature the amount of such costs.

9.5 PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK. Extra work, performed in accordance with the subsection titled EXTRA WORK of this section, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work. When the change order or supplemental agreement authorizing the extra work requires that it be done by force account, such force account shall be measured and paid for based on expended labor, equipment, and materials plus a negotiated and agreed upon allowance for overhead and profit.

a. Miscellaneous. No additional allowance will be made for general superintendence, the use of small tools, or other costs for which no specific allowance is herein provided.

b. Comparison of Record. The Contractor and the Engineer shall compare records of the cost of force account work at the end of each day. Agreement shall be indicated by signature of the Contractor and the Engineer or their duly authorized representatives.

c. Statement. No payment will be made for work performed on a force account basis until the Contractor has furnished the Engineer with duplicate itemized statements of the cost of such force account work detailed as follows:

(1) Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.
(2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.
(3) Quantities of materials, prices, and extensions.
(4) Transportation of materials.
(5) Cost of property damage, liability and workman's compensation insurance premiums, unemployment insurance contributions, and social security tax.

Statements shall be accompanied and supported by a receipted invoice for all materials used and transportation charges. However, if materials used on the force account work are not specifically purchased for such work but are taken from the Contractor's stock, then in lieu of the invoices the Contractor shall furnish an affidavit certifying that such materials were taken from his/her stock, that the quantity claimed was actually used, and that the price and transportation claimed represent the actual cost to the Contractor.

9.6 PARTIAL PAYMENTS. Partial payments will be made at least once each month as the work progresses. Said payments will be based upon estimates prepared by the Engineer of the value of the work performed and materials complete in place in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection titled PAYMENT FOR MATERIALS ON HAND of this section.

No partial payment will be made when the amount due the Contractor since the last estimate amounts to less than five hundred dollars.

From the total of the amount determined to be payable on a partial payment, 10 percent of such total amount will be deducted and retained by the owner until the final payment is made, except as may be provided (at the Contractor's option) in the subsection titled PAYMENT OF

WITHHELD FUNDS of this section. The balance (90 percent) of the amount payable, less all previous payments, shall be certified for payment. Should the Contractor exercise his/her option, as provided in the subsection titled PAYMENT OF WITHHELD FUNDS of this section, no such 10 percent retainage shall be deducted.

The City will retain ten percent (10%) of the amount of each such partial payment to insure full and faithful compliance with the terms of these contract documents. After fifty percent (50%) of the work on this project has been completed, one half of the amount retained shall be paid to the Contractor provided the Contractor is making satisfactory progress on the contract and there is no specific clause or claim requiring a greater amount to be retained. After the contract is fifty percent (50%) completed, only five percent (5%) of the amount of any subsequent progress payments made under the contract shall be retained provided the Contractor is making satisfactory progress on the project, except that if at any time the City determines satisfactory progress is not being made, ten percent (10%) retention shall be reinstated for all progress payments made under the contract subsequent to the determination.

It is understood and agreed that the Contractor shall not be entitled to demand or receive partial payment based on quantities of work in excess of those provided in the proposal or covered by approved change orders or supplemental agreements, except when such excess quantities have been determined by the Engineer to be a part of the final quantity for the item of work in question.

No partial payment shall bind the owner to the acceptance of any materials or work in place as to quality or quantity. All partial payments are subject to correction at the time of final payment as provided in the subsection titled ACCEPTANCE AND FINAL PAYMENT of this section.

9.7 PAYMENT FOR MATERIALS ON HAND. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

a. The material has been stored or stockpiled in a manner acceptable to the Engineer at or on an approved site.

b. The Contractor has furnished the Engineer with acceptable evidence of the quantity and quality of such stored or stockpiled materials.

c. The Contractor has furnished the Engineer with satisfactory evidence that the material and transportation costs have been paid.

d. The Contractor has furnished the Owner legal title (free of liens or encumbrances of any kind) to the material so stored or stockpiled.

e. The Contractor has furnished the Owner evidence that the material so stored or stockpiled is insured against loss by damage to or disappearance of such materials at any time prior to use in the work.

It is understood and agreed that the transfer of title and the Owner's payment for such stored or stockpiled materials shall in no way relieve the Contractor of his/her responsibility for furnishing and placing such materials in accordance with the requirements of the contract, plans, and specifications.

In no case will the amount of partial payments for materials on hand exceed the contract price for such materials or the contract price for the contract item in which the material is intended to be used.

No partial payment will be made for stored or stockpiled living or perishable plant materials.

The Contractor shall bear all costs associated with the partial payment of stored or stockpiled materials in accordance with the provisions of this subsection.

9.8 PAYMENT OF WITHHELD FUNDS. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in the subsection titled PARTIAL PAYMENTS, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

a. The Contractor shall bear all expenses of establishing and maintaining an escrow account and escrow agreement acceptable to the Owner.

b. The Contractor shall deposit to and maintain in such escrow only those securities or bank certificates of deposit as are acceptable to the Owner and having a value not less than the retainage that would otherwise be withheld from partial payment.

c. The Contractor shall enter into an escrow agreement satisfactory to the Owner.

d. The Contractor shall obtain the written consent of the surety to such agreement.

9.9 ACCEPTANCE AND FINAL PAYMENT. When the contract work has been accepted in accordance with the requirements of the subsection titled FINAL ACCEPTANCE of Section 5, the Engineer will prepare the final estimate of the items of work actually performed. The Contractor shall approve the Engineer's final estimate or advise the Engineer of his/her objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the Engineer shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the Engineer's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the Engineer's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with the subsection titled CLAIMS FOR ADJUSTMENT AND DISPUTES of this section.

After the Contractor has approved, or approved under protest, the Engineer's final estimate, final payment will be processed based on the entire sum, or the undisputed sum in case of approval under protest, determined to be due the Contractor less all previous payments and all amounts to be deducted under the provisions of the contract. All prior partial estimates and payments shall be subject to correction in the final estimate and payment.

If the Contractor has filed a claim for additional compensation under the provisions of the subsection titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of this section or under the provisions of this subsection, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

10. CONTRACTOR QUALITY CONTROL PROGRAM

10.1 GENERAL. When the specification requires a Contractor Quality Control Program, the Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The intent of this section is to enable the Contractor to establish a necessary level of control that will:

a. Adequately provide for the production of acceptable quality materials.

b. Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.

c. Allow the Contractor as much latitude as possible to develop his or her own standard of control.

The Contractor shall be prepared to discuss and present, at the preconstruction conference, his/her understanding of the quality control requirements. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the Quality Control Program has been reviewed by the Engineer. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed.

The quality control requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the acceptance testing requirements. Acceptance testing requirements are the responsibility of the Engineer.

10.2 DESCRIPTION OF PROGRAM.

a. General Description. The Contractor shall establish a Quality Control Program to perform inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. This Quality Control Program shall ensure conformance to applicable specifications and plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical

specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of quality control.

b. Quality Control Program. The Contractor shall describe the Quality Control Program in a written document that shall be reviewed by the Engineer prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Engineer for review at least 5 calendar days before the preconstruction conference.

The Quality Control Program shall be organized to address, as a minimum, the following items:

a. Quality control organization

b. Project progress schedule

c. Submittals schedule

d. Inspection requirements

e. Quality control testing plan

f. Documentation of quality control activities

g. Requirements for corrective action when quality control and/or acceptance criteria are not met

The Contractor is encouraged to add any additional elements to the Quality Control Program that he/she deems necessary to adequately control all production and/or construction processes required by this contract.

10.3 QUALITY CONTROL ORGANIZATION. The Contractor Quality Control Program shall be implemented by the establishment of a separate quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the Quality Control Program, the personnel assigned shall be subject to the qualification requirements of paragraph 10.3a and 10.3b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The quality control organization shall consist of the following minimum personnel:

a. Program Administrator. The Program Administrator shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall

have a minimum of 5 years of experience in airport and/or highway construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

Additional qualifications for the Program Administrator shall include at least 1 of the following requirements:

(1) Professional engineer with 1 year of airport paving experience acceptable to the Engineer.

(2) Engineer-in-training with 2 years of airport paving experience acceptable to the Engineer.

(3) An individual with 3 years of highway and/or airport paving experience acceptable to the Engineer, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

(4) Construction materials technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).

(5) Highway materials technician certified at Level III by NICET.

(6) Highway construction technician certified at Level III by NICET.

(7) A NICET certified engineering technician in Civil Engineering Technology with 5 years of highway and/or airport paving experience acceptable to the Engineer.

The Program Administrator shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract plans and technical specifications. The Program Administrator shall report directly to a responsible officer of the construction firm. The Program Administrator may supervise the Quality Control Program on more than one project provided that person can be at the job site within 2 hours after being notified of a problem.

b. Quality Control Technicians. A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program shall be provided. These personnel shall be either engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II or higher construction materials technician or highway construction technician and shall have a minimum of 2 years of experience in their area of expertise.

The quality control technicians shall report directly to the Program Administrator and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by Paragraph 10.6.

(2) Performance of all quality control tests as required by the technical specifications and Paragraph 10.7.

Certification at an equivalent level, by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing Levels. The Contractor shall provide sufficient qualified quality control personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The Quality Control Program shall state where different technicians will be required for different work elements.

10.4 PROJECT PROGRESS SCHEDULE. The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), PERT, or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract. Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract.

10.5 SUBMITTALS SCHEDULE. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

10.6 INSPECTION REQUIREMENTS. Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by Paragraph 10.7.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

a. During plant operation for material production, quality control test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other

requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The Quality Control Program shall detail how these and other quality control functions will be accomplished and used.

b. During field operations, quality control test results and periodic inspections shall be used to ensure the quality of all materials and workmanship. All equipment used in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The Program shall document how these and other quality control functions will be accomplished and used.

10.7 QUALITY CONTROL TESTING PLAN. As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Specification item number (for example, P-401)

b. Item description (for example, Plant Mix Bituminous Pavements)

c. Test type (for example, gradation, grade, asphalt content)

d. Test standard (for example, ASTM or AASHTO test number, as applicable)

e. Test frequency (for example, as required by technical specifications or minimum frequency when requirements are not stated)

f. Responsibility (for example, plant technician)

g. Control requirements (for example, target, permissible deviations)

The testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D 3665. The Engineer shall be provided the opportunity to witness quality control sampling and testing.

All quality control test results shall be documented by the Contractor as required by Paragraph 10.8.

10.8 DOCUMENTATION. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Engineer daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the Contractor's Program Administrator.

Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily Inspection Reports. Each Contractor quality control technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations on a form acceptable to the Engineer. These technician's daily reports shall provide factual evidence that continuous quality control inspections have been performed and shall, as a minimum, include the following:

(1) Technical specification item number and description;
(2) Compliance with approved submittals;
(3) Proper storage of materials and equipment;
(4) Proper operation of all equipment;
(5) Adherence to plans and technical specifications;
(6) Review of quality control tests; and
(7) Safety inspection.

The daily inspection reports shall identify inspections conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible quality control technician and the Program Administrator. The Engineer shall be provided at least one copy of each daily inspection report on the work day following the day of record.

b. Daily Test Reports. The Contractor shall be responsible for establishing a system that will record all quality control test results. Daily test reports shall document the following information:

(1) Technical specification item number and description
(2) Test designation
(3) Location
(4) Date of test
(5) Control requirements
(6) Test results
(7) Causes for rejection
(8) Recommended remedial actions
(9) Retests

Test results from each day's work period shall be submitted to the Engineer prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Program Administrator.

10.9 CORRECTIVE ACTION REQUIREMENTS. The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and use statistical quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

10.10 SURVEILLANCE BY THE ENGINEER. All items of material and equipment shall be subject to surveillance by the Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed herein and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Engineer at the site for the same purpose.

Surveillance by the Engineer does not relieve the Contractor of performing quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

10.11 NONCOMPLIANCE.

a. The Engineer will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or his/her authorized representative to the Contractor or his/her authorized representative at the site of the work, shall be considered sufficient notice.

b. In cases where quality control activities do not comply with either the Contractor Quality Control Program or the contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Engineer, the Engineer may:

(1) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.
(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

SPECIAL PROVISIONS

1. SCOPE OF WORK:

   a. Disassembling and relocating of existing blast fences.

   b. Relocating manual swing chain link fence gate.

   c. Construct blast pads at each runway end.

   d. Construct dust cap at north runway end.

   e. Stripe ramp markings.

   f. Relocate wind cone.

2. DEFINITIONS:

   a. Section: Reference to a Section on the plans or in these Specifications shall mean a Section of the Uniform Standard Specifications for Public Works Construction, sponsored and distributed by Maricopa Association of Governments (MAG), latest revision. The provisions of MAG Uniform Standard Specifications and Details for Public Works Construction, which are not altered or modified by the drawings or by these Special Provisions or by any subsequently issued Addendum, shall apply to the contract even though the Contractor's attention is not specifically drawn to such provisions.

   b. Standard Detail: Reference to a MAG Standard Detail (MAG S.D.) on the plans or in these specifications shall mean a standard detail drawing in the latest revision of the Uniform Standard Specifications for Public Works Construction, sponsored and distributed by Maricopa Association of Governments. City of Glendale Standard Detail (C.O.G. S.D.) shall mean a standard detail drawing in the City of Glendale's Engineering Design and Construction Standards, latest revision. City of Phoenix Standard Detail (C.O.P. S.D.) shall mean a standard detail drawing in the Phoenix Supplemental Standard Details for Public Works Construction, latest revision.

3. CONSTRUCTION SURVEYING AND LAYOUT: The work under this item shall consist of furnishing all materials, personnel, equipment, and traffic control necessary to perform all surveying, staking, and verification of the accuracy of all control points per the plans and as directed by the Engineer. Included in this work shall be all calculations required for the satisfactory completion of the project in conformance with the plans and these Special Provisions. The work shall be done under the direction of a registered professional engineer or a registered land surveyor employed by the Contractor. The crew chief shall be NICET Certified Level III or a registered land surveyor. The Contractor shall furnish all equipment, materials and other devices necessary for establishing, checking, marking and maintaining points, lines, grades and layouts.

Throughout the work, the Contractor shall set all stakes including, but not limited to; centerline stakes; offset stakes; reference point stakes; slope stakes; pavement lines, curb lines and grade stakes at intervals not greater than 25 feet; stakes for sewers, roadway drainage, pipe, under drains, clearing, paved gutter, fence, right of way markers, and survey monuments; blue tops of subgrade, subbase and base courses at intervals not greater than 50 feet; permanent as-built elevation marks; and all other horizontal or vertical controls necessary for complete and accurate layout and construction of the work. Stakes for horizontal and vertical curves shall be set at intervals appropriate for the length of curve. The coordinates of any new control points established by the Contractor during the course of the work shall be given to the Engineer within five working days of control point establishment.

Field notes shall be kept in standard field notebooks furnished by the Contractor. Field notes shall be kept in a clear, orderly and neat manner consistent with standard surveying practices. The standard field notebooks or copies of, shall be made available to the Engineer upon request at any time during the prosecution of the work.

When utility adjustments are a part of the contract, the Contractor shall perform all layout work and set all control points, stakes and references necessary for carrying out all such adjustments.

The Contractor shall cross-section all fill areas for monthly, quantity estimates and as directed by the Engineer. The Engineer may verify the accuracy of same. The Engineer shall check all measurements that involve determination of final quantities.

Any errors, omissions or discrepancies in the project plans shall be immediately brought to the attention of the Engineer. The Contractor shall promptly notify the Engineer in writing, explaining the problem in detail. The Engineer will advise the Contractor within three working days of any corrective actions deemed necessary. No changes in the project plans will be allowed without the approval of the Engineer.

The Contractor shall be compensated for additional work associated with survey and layout when:

a. The project plans do not provide sufficient information and new calculations must be performed.

b. The Contractor performs survey work based on erroneous plan information, which results in the duplication of work.

c. Changes by the Engineer to the plan information for which the Contractor has already performed the work and results in the duplication of such work.

The Contractor shall not be due compensation for any survey work when:

a. Information provided on the plans is sufficiently complete to allow any additional information necessary for the complete layout of the work to be routinely calculated.

b. The Contractor fails to inform the Engineer of discovered plan errors before the performance of any extra survey work.

c. Work is included in any other pay item.

The Contractor shall inform the Engineer in a timely manner of any omissions, ambiguities, or errors which the Contractor feels may result in extra calculations or survey work, so as not to delay the project or create any unnecessary calculations.

All additional survey work shall be documented by the Contractor and verified by the Engineer before compensation may be granted. Documentation shall consist of a detailed diary specifically addressing the work involved in the alleged problem area. The Contractor may be required to provide calculations, charts, graphs, drawings, or any other physical evidence, which will verify additional work.

The Contractor shall be responsible for verifying curb and gutter grades before placement of concrete using a steel straightedge, string line or other method approved by the Engineer. The field verification shall be performed in the presence of the Engineer or designated representative.

The Engineer reserves the right to make inspections and random checks of the staking and layout. Inspection or acceptance of all or any part of the Contractor's staking and layout by the Engineer does not relieve the Contractor of full responsibility to secure the proper dimensions, grades and elevations of the work.

If, in the Engineer's opinion, the work is not being performed in a manner that will assure proper controls and accuracy, the Engineer will order any or all of the staking and layout work redone at no additional cost to the City. If any portion of the Contractor's staking and layout work is ordered redone and requires additional rechecking by the Engineer, the City shall be reimbursed for all costs for such additional checking. The amount of such costs will be deducted from the Contractor's monthly estimate.

The Contractor shall provide final "as-constructed" field surveying, including both vertical and horizontal data based on the finished work. The Contractor shall also furnish final Record Drawings for all improvements. The Record Drawings shall be prepared by a Registered Land Surveyor and submitted to the Owner for approval prior to final acceptance of the project. The Record Drawings shall be prepared on a set of reproducible copies of the construction plans. The completed drawings shall be signed and sealed by the Registered Land Surveyor responsible for obtaining the As-built information and preparing the Record Drawings.

All survey field books and documentation shall be available for inspection by the Engineer.

Payment for this item will be made at the contract lump sum price fully complete for CONSTRUCTION SURVEYING AND LAYOUT.

4. SUSPENSION OF WORK: The Engineer reserves the right to suspend the work wholly or in part if deemed necessary for the best interest of the City. This suspension will be without compensation to the Contractor, other than to adjust the contract time in accordance with MAG Section 108.

5. COMPLIANCE WITH MANUFACTURER'S INSTRUCTIONS: In all instances wherein the item and/or specifications require installation or construction in accordance with either manufacturer's or supplier's recommendations and/or instructions, said recommendations and/or instructions shall be submitted with the applicable portions clearly marked for approval prior to the commencement of work on that item or portion of the contract.

6. TRAFFIC REGULATIONS:

6.1 All vehicle traffic affected by this construction shall be regulated in accordance with the City of Phoenix "Traffic Barricade Manual," the "Manual of Uniform Traffic Control Devices" and these Special Provisions. The following traffic restrictions are minimum requirements throughout the construction period:

6.1.1 All references in the City of Phoenix "Traffic Barricade Manual" and the "Manual of Uniform Traffic Control Devices" to "arterial" and/or "collector" streets shall mean "arterial and/or major arterial" streets and are referred to as "major" streets in the following sections.

6.1.2 A minimum of two travel lanes (one for each direction) shall be maintained open to traffic at all times on all major streets. All work that enters or crosses a major street must be done at times other than 6:00 a.m. to 8:30 a.m., and 4:00 p.m. to 6:00 p.m. unless approved by the Transportation Director or Designee.

6.1.3 A travel lane shall be defined as ten (10) feet of roadway not obstructed by traffic control devices with a safe motor vehicle operating speed of twenty-five (25) miles per hour.

6.1.4 A travel lane will not be considered as open to traffic until it has been graded reasonably smooth and is paved with a minimum of two (2) inches of asphalt. This shall be considered temporary pavement and shall be removed completely before proceeding with final surfacing.

6.1.5 The Contractor shall provide and maintain all required and requested traffic control devices to protect and guide traffic for all work in the construction area.

6.1.6 Intersection area shall be defined as all of the area within the right-of-way of intersecting streets, plus two-hundred fifty (250) feet beyond the center of the intersected streets on all legs of the intersection.

6.1.7 The Contractor shall maintain all existing traffic signs erect, clean and in full view of the intended traffic at all times. Street name signs at major street intersections shall be maintained erect at all times. If any signs interfere with construction, the Contractor shall notify the Transportation Department at least 48 hours in advance before covering or removing said signage. The Contractor shall be responsible for reinstalling all signs removed or covered and verifying they are correctly placed. The Transportation Department will inspect all signage prior to completion of the project.

6.1.8 Local access to all properties on the subject project shall be maintained at all possible times in the form of a safe and reasonable direct route to at least one of the above defined major streets. Whenever local access cannot be maintained, the Contractor shall notify the affected property owner or user and the Engineer at least Seventy-Two (72) hours in advance.

6.1.9 The Contractor shall be required to provide a uniformed off-duty City of Glendale police officer to assist with traffic control whenever traffic in any one direction is restricted to one lane at a signalized major intersection or at other locations if it should become necessary in the opinion of the Transportation Director or Designee. All requests for off-duty officers will be made through the Glendale Police Department, Off-Duty Work Administrator. The Contractor must provide evidence of workmen's compensation coverage before any officer will be permitted to work. No separate measurement or payment shall be made for off-duty police officers, the cost of which shall be considered incidental to Traffic Control & barricading.

6.1.10 The Contractor shall prepare a traffic control plan for the project and submit it to the City Transportation Director or Designee for review and approval at least fifteen (15) working days prior to the start of construction. The traffic control plan must be submitted through the City of Glendale on-Line Traffic Control Plan application process at www.glendaleaz.com/transportation/TrafficControlForm.cfm. The traffic control plan shall include message boards installed a minimum of seven (7) working days prior to restrictions when requested by the Transportation Director or Designee, additional public notification shall be required for major restrictions that impact adjacent stakeholders. Any changes to the traffic control plan during construction shall be submitted to the City Transportation Director or Designee for approval at least seventy-two (72) hours before implementation.

Payment for this item shall be considered incidental to Traffic Control and Barricading.

6.1.11 It is the City's desire to maintain one lane of traffic in each direction on minor streets whenever possible. Should it become imperative for the Contractor to close off a portion of any minor street or reduce the travel way to a single lane, he/she must obtain approval from the City Transportation Director or Designee Seventy-Two (72) hours prior to implementing a traffic control change. He/she must provide all the necessary signs to detour traffic and/or flag person to control traffic for a single lane. The maximum amount of time that the street may be closed is from 9:00 a.m. until 4:00 p.m.

7. ENERGIZED AERIAL ELECTRICAL POWER LINES: The utility company maintains energized aerial electrical power lines in the immediate vicinity of this project. Do not consider these lines to be insulated. Construction personnel working in proximity to these lines are exposed to an extreme hazard from electrical shock. Contractors, their employees, and all other construction personnel working on this project must be warned of the danger and instructed to take adequate protective measures, including maintaining a minimum ten (10) feet clearance between the lines and all construction equipment and personnel. (See: OSHA Standard 1926.550(a)15.) As an additional safety precaution, Contractors should also be instructed to call the utility company to arrange, if possible, to have these lines de-energized or relocated when the work reaches their immediate vicinity. The cost of such temporary arrangements would be borne by the Contractor. The utility company can often respond to such requests if two days advance notice is given, but some situations may require up to sixty (60) days lead time for relocation or other arrangements.

8. NOT USED

9. RECORD DRAWINGS: The Contractor shall maintain one set of contract drawings with all changes, deviations, additions and deletions clearly marked thereon. Upon completion of the work, this set of drawings, shall be marked "RECORD DRAWINGS," dated, and delivered to the Engineer prior to approval of the Contractor's final payment request.

10. SOILS REPORT: The boring logs for this project are included after the FAA Advisory Circular AC150/5340-1K for your review. The boring logs are provided only as a courtesy. The boring logs are not incorporated into, or part of, the contract and the City of Glendale makes no warranties, express or implied, as to the accuracy of the information contained therein. The Contractor should not rely on the information contained therein and should perform its own investigation as to the subsurface conditions of the project. The boring logs are not intended, nor should they be relied upon by the Contractor as, a representation of the true soil conditions of the project. If there is a conflict between this provision and any other provision of the contract documents, this provision will prevail. The Contractor will accomplish the project under whatever condition he finds at the contract price.

11. CASH FLOW REPORT: The Contractor shall prepare a Cash Flow Report for projected monthly project cash flow on a City provided form and submit it for approval prior to issuance of the Notice to Proceed. The accumulation of monthly pay estimate costs shall be plotted versus time in accordance with the proposed construction schedule. After approval, the Contractor shall submit an updated Cash Flow Report prior to the receipt of each Progress Payment. Each updated Cash Flow Report shall reflect the Contractor's actual monthly payment versus the actual elapsed contract time.

At the City's request, if the projected quarterly project cash flow varies by more than ten percent of the total contract price, the Contractor shall prepare a revised Cash Flow Report. Each revised Cash Flow Report is subject to approval by the City prior to issuance of the progress payment.

Revisions to the report resulting from Contractor initiated delays or work schedule changes shall be at no cost to the City. Any revisions required by City initiated delays or changes to the work shall be paid as an integral part of the approved Change Order.

Project Life Cycle Cash Flow Schedule

GLENDALE

Project No . _____ Date· _____

Project Name: _____

Company Name

Project Start Date· _____ Project Completion Date _____

Original ☐ Updated ☐ Revised ☐

		Estimated		Actual	
Qtr.	Fiscal Yr.	Amount	Accum	Amount	Accum
1st	07/06 - 09/06	$ -			
2nd	10/06 - 12/06				
3rd	01/07 - 03-07				
4th	04/07 - 06/07				
1st	07/07 - 09/07			$ -	$ -
2nd	10/07 - 12/07				
3rd	01/08 - 03/08				
4th	04/08 - 06/08				
1st	07/08 - 09/08		$ -	$ -	$ -
2nd	10/08 - 12/08				
3rd	01/09 - 03/09				
4th	04/09 - 06/09				
1st	07/09 - 09/09	$ -	$ -	$ -	$ -
2nd	10/09 - 12/09				
3rd	01/10 - 03/10				
4th	04/10 - 06/10				
1st	07/10 - 09/10				
2nd	10/10 - 12/10	$ -	$ -	$ -	$ -
3rd	01/11 - 03/11				
4th	04/11- 06/11				
	Totals	$ -		$ -	

* COG's fiscal year is July 1, (current year) through June 30, (following year)

For Engineering Use Only:

Account No. _____ PO No. _____

12. CONSTRUCTION SIGN: The project type to be indicated on the sign shall be "0910005 – Runway Safety Improvements."

CONSTRUCTION SIGN DETAIL

CONSTRUCTION SIGNS ARE TO BE IN PLACE BEFORE PHYSICAL CONSTRUCTION BEGINS

SIGNS SHALL BE MADE OF 3/4" AC EXTERIOR PLYWOOD OR OTHER MATERIAL APPROVED BY THE ENGINEER

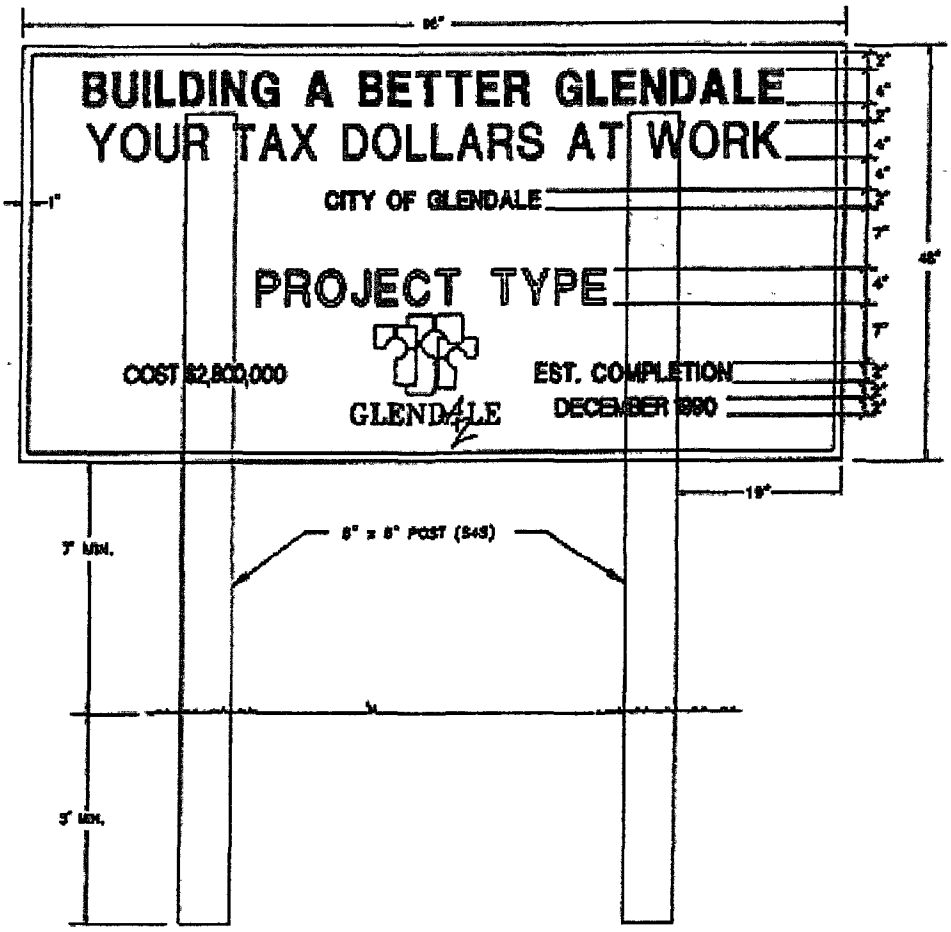
BACKGROUND TO BE PAINTED WHITE WITH STENCIL BLACK LETTERS, NUMERALS AND BORDER.

POSTS SHALL BE PAINTED WHITE. ALL MOUNTING HARDWARE TO BE RUST PROOF MATERIAL

SIGNS SHALL BE SO PLACED THAT THEY WILL NOT OBSCURE OR DETRACT FROM OTHER SIGNING.

CONTRACTOR TO FILL IN THE PROJECT TYPE, COMPLETION DATE, AND COST AS DIRECTED.

THE 12"X13" TWO COLOR GLENDALE LOGO IS AVAILABLE BY CONTACTING THE CITY OF GLENDALE ENGINEERING DEPT. COST $16.00



13. SECURITY PRECAUTIONS: Special security precautions are required and identification of all vehicles and personnel entering onto the airside of the airport will be necessary. Further instructions regarding these requirements will be provided at the Pre-Construction Conference. Equipment and workmen will be restricted to the work areas defined on the drawings. Any gates utilized by the Contractor for access to the project shall be secured and locked whenever the Contractor is not working and at the end of all shifts. Security Precautions shall be considered incidental to the Project and no additional payment will be authorized for Security Precautions. The airport perimeter shall remain fenced at all times during the project.

14. CONTRACTOR'S RECORDS: The Contractor shall maintain an acceptable cost accounting system. The Sponsor, the FAA, the Comptroller General of the United States and ADOT shall have access to any books, documents, paper and records of the contractor which are directly pertinent to this specific contract for the purposes of making an audit, examination, excerpts, and transcriptions. The contractor shall maintain all required records for five years after the Sponsor makes final payment and all other pending matters are closed.

15. TESTING: The City's designated laboratory will perform certain tests on materials and the grade as indicated in the specifications. The purpose of the testing will be to verify the quality in the finished product for the Owner. The testing will in no way relieve the Contractor of his responsibility for his own quality control and assurance and furnishing materials and finish products that meet the project specifications. Included in the testing performed by the City's designated laboratory will be density tests on the embankment lifts, finished subgrade, finished aggregate base course, backfill, and asphaltic concrete cores. Concrete will be sampled for test cylinders to test compression strength. Other testing may be required at the discretion of the City. The Owner reserves the right to require the Contractor to reimburse the cost of retesting when repeated failures occur.

16. PROTECTION OF EXISTING AIRPORT FACILITIES: The Contractor will be required to protect all existing pavement, paintstriping, lights, navaids, drainage structures and other facilities on the airport that are not specifically called for removal as part of this project. Any damage done by the Contractor or through his operations shall be repaired at the Contractor's expense to the satisfaction of the Engineer and the City.

17. SHOP DRAWINGS AND SUBMITTALS: The Contractor shall submit eight (8) copies of all shop drawings and submittals to the Engineer for approval.

18. OPERATIONAL SAFETY & MARKING: All work on this project is within the limits of Glendale Municipal Airport operational area, and as such, strict safety and security requirements are in effect. The Contractor's attention is directed to FAA Advisory Circular 150/5370-2F which is incorporated into these Contract Documents by reference. This is a non-pay item. The Contractor's attention is directed to FAA Advisory Circular 150/5210-5D which is incorporated into these Contract Documents by reference. All contract vehicles and equipment shall be provided with 3' x 3' orange and white checkered flags or flashing amber lights as described in Paragraph 7.c. All vehicles must have the company name legibly visible on each side of the vehicle, in a minimum 4-inch high lettering painted in contracting colors, or magnetic placecards meeting the standard. This is a non-pay item. The Contractor's attention is directed to FAA Advisory Circular 150/5340-1K which is incorporated into these Contract Documents by reference. The requirements of Paragraphs 39 and 41 regarding marking closed or hazardous areas shall be adhered to.

19. MOBILIZATION:

19.1 Description.

Work under this section shall consist of preparatory work and operations, including but not limited to, the movement of personnel, equipment, supplies and incidentals to the project site; the establishment of all offices, buildings and other facilities necessary for work on the project, and for all other work and operations that must be performed and costs incurred prior to the beginning work on the various items on the project site.

19.2 Method of Measurement.

Mobilization will be measured for payment by the lump sum as a single complete unit of work.

19.3 Basis of Payment.

Payment for mobilization, measured as approved above, will be made at the contract lump sum basis for MOBILIZATION, which shall be full compensation for supplying and furnishing all materials, facilities and services and performing all the work involved as specified herein.

Partial payments under this item will be made in accordance with the following provisions: (Reference herein to the original contract amount shall mean the original contract amount exclusive of mobilization/demobilization).

When five percent of the original contract amount is earned, either 50 percent of the amount bid for mobilization, or five percent of the original contract amount, whichever is lesser, will be paid.

When ten percent of the original contract is earned, either 100 percent of the amount bid for mobilization, or ten percent of the original contract amount , whichever is lesser, will be paid.

The total sum of all payment shall not exceed the original contract amount bid for mobilization, regardless of the fact that the contract may have, for any reason, shut down his work on the project or moved his equipment away from the project and back again.

Payment will be made under:

Mobilization (SP-19) --per lump sum

20. BUY AMERICAN REQUIREMENT: No steel or manufactured products produced outside the United States shall be used on this project.

21. FOREIGN MARKET RESTRICTIONS: No product or service of a foreign country that is listed by the United States Trade Representative as denying fair and equitable market opportunities for products and suppliers of the United State in procurement or construction shall be used on this project.

22. STORMWATER POLLUTION PREVENTION: The work under this item shall consist of furnishing all materials, labor, and equipment necessary to comply with all National Pollutant Discharge Elimination System (NPDES) requirements for erosion control during construction, as specified under the Environmental Protection Agency (EPA) General Permit for Arizona.

The work shall include providing, installing, maintaining, removing and disposing of erosion control measures such as gravel filter berms, dikes, catch basin inlet protection, end-of-pipe filtering devices, silt fences, dams, sediment basins, netting, straw bale barriers, slope drains, and other erosion control devices or methods.

The "Best Management Practices and Erosion Control Manual", published by the Maricopa County Flood Control District, shall be used as guidelines to prepare the Stormwater Pollution Prevention Plan.

This work shall include preparing and revising as necessary a comprehensive stormwater pollution prevention plan, including descriptions of proposed measures to be implemented, a schedule detailing the proposed coordination for accomplishing the erosion control features in a timely and appropriate manner, and site-specific diagrams indicating proposed locations where erosion control devices or measures may be required during successive construction stages.
Permit Requirements:

The Contractor shall be designated as permittee, and shall eliminate a minimum of 80 percent of the construction-related sediment resulting from stormwater runoff from the Project.

All subcontractors shall comply with the requirements of the NPDES under the supervision of the General Contractor.

The Contractor shall complete the following documents.

1. Stormwater Pollution Prevention Plan (SWPPP) for the Project, including certification of compliance form.

2. Notice of Intent (NOI) to be covered by NPDES General Permit for Arizona, including certification of signature.

3. Inspection and Maintenance Reports.

4. Notice of Termination (NOT) of coverage under NPDES General Permit.

The Contractor shall submit the SWPPP to the Engineer for approval at the preconstruction conference. The Contractor shall also transmit preliminary copies of the NOI, as indicated on the NOI form, at the preconstruction conference. Approval of the SWPPP does not relieve the Contractor of the responsibility to comply with the NPDES permit or other permit requirements.

The Contractor (and all other co-permittees) shall submit completed, signed NOI forms at least 48 hours prior to Notice to Proceed date on the Project to the EPA at the following address:

Stormwater Coordinator
Water Permits Unit
ADEQ
1100 W. Washington
Phoenix, AZ 85007

If the Contractor fails to provide the required submissions within the specified time frame, the Engineer will suspend the Work until such time as they are furnished. The Contractor shall not be entitled to additional compensation or an additional extension of contract time resulting from any delays due to any suspension.

The NOI shall be posted on the construction site along with the SWPPP.

A copy of the NOI shall be sent to:

City of Glendale Engineering Department
5850 West Glendale Avenue
Glendale, Arizona, 85301

Construction Requirements:

The Contractor shall be prepared to implement the SWPPP at the onset of any rainfall, such that 80 percent of the construction-related sediment which is generated from stormwater runoff with the Project is eliminated.

The Contractor shall maintain all related construction elements in proper working order, including cleaning and repair. No separate payment will be made for such inspections, cleaning or repair.

The Contractor shall review the SWPPP and revise it as necessary throughout the duration of the contract, in order to assure compliance with the EPA permit requirements. The Contractor shall submit all revisions to the SWPPP to the Engineer for approval prior to implementation.

The Contractor shall perform monthly and major rainfall event inspections in accordance with the requirements of the EPA and document the findings.

The Engineer will inspect the condition of all measures listed in SWPPP. The Contractor shall provide the Engineer with all documents in accordance with the record keeping requirements of the EPA.

All SWPPP reports required under this contract shall be available to the public in accordance with the requirements of section 308(b) of the Clean Water Act. The Contractor as a permittee of construction activities with Stormwater discharges covered by the Arizona General Permit shall make plans available to the public upon request through the EPA.

No condition of the Arizona General Permit as well as the SWPPP shall release the Contractor from any responsibilities or requirements under other environmental statutes or regulations.

The final SWPPP shall be kept on the Project site at all times, and shall be retained by the permittee for three years following the final acceptance.

Upon final stabilization of the construction site, and demobilization, the contractor shall submit his completed signed NOT form to the EPA, with copies to the Engineer, and Agencies who received a copy of NOI, thereby terminating all NPDES permit coverage for the Project.

Basis of Payment

The lump sum bid price for Stormwater Pollution Prevention shall include all work such as design, placement, construction, maintenance, inspection, removal and disposal of all elements required by the NPDES permit coverage. Payment shall be made monthly with equal payment during the entire construction period with 10% retention to be paid after filing of NOT. Cost of revision and implementation of SWPPP during construction period shall be considered as included in the price of the lump sum item.

No measurement or direct payment will be made for preparing the Stormwater Pollution Prevention Plan (SWPPP), the Notice of Intent (NOI), Notice of Termination (NOT), Inspection and Maintenance Report, or other documentation required to perform the work, the cost being considered as included in the price of the contract item.

Payment will be made under:

Stormwater Pollution Prevention (SP-22) -- per lump sum

23. CHANGE ORDERS: All changes in work requiring change orders must be submitted for review and approval to the City, the FAA and ADOT. Approval from all of the above agencies must be received before any additional work proceeds.

24. ADOT AND FAA APPROVALS: All supplemental agreements, change orders or other modifications to the plans and specifications are subject to review and approval by the ADOT, and the Federal Aviation Administration.

25. BITUMINOUS PRIME COAT: This item shall consist of an application of bituminous material on the prepared base course in accordance with the locations shown on the plans and with MAG Uniform Standard Specifications Section 315. The bituminous prime coat shall be MC-70. Measurement and payment for this item shall be made at the contract unit price per square yard of bituminous prime coat furnished and installed in accordance with the project specifications and accepted by the Engineer. This price shall be full compensation for all labor, materials, and equipment necessary to complete this item.

Payment will be made under:

Bituminous Prime Coat (SP-25) -- per square yard

26. SAWCUT & REMOVE EXISTING ASPHALTIC CONCRETE PAVEMENT: This item shall consist of sawcutting and removing the existing asphaltic concrete pavement structural section as indicated on the plans. Included in the item shall be the sawcutting of the existing pavement in accordance with MAG Uniform Standard Specifications Section 336 and the removal and disposal of the existing asphaltic concrete pavement. The Contractor shall remove and dispose of all asphaltic concrete off of the airport property. Measurement and payment for this item will be made at the contract unit price per square yard for asphaltic concrete pavement removed and disposed of. This price shall be full compensation for all labor, equipment, and materials necessary to complete this item.

Payment will be made under:

Sawcut & Remove Existing AC Pavement (SP-26) -- per square yard

27. TRAFFIC CONTROL & BARRICADING: This item shall consist of all work necessary to barricade and mark closed roadways, taxiways, aprons, and all other work areas as well as all work necessary to monitor gate access, and barricade and mark contractor work areas and haul routes. All temporary markings and traffic control for runway and taxiway closures shall be in conformance with the requirements of the Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5370-2E.

The Contractor shall have VHF radios and monitor the air traffic control frequency throughout the project.

The Contractor shall post a trained guard at any gate used for access to the Airport, and monitor traffic in and out of the gate. All gates that are not attended by a guard shall be closed and locked. Manned gates shall have a lifting gate to cover the width of the opening that is operated by the guard. Measurement and payment for this work will be included in the lump sum contract price for Traffic Control and Barricading.

The Contractor shall comply with the Construction Safety Plan. Special security precautions are required and identification of all vehicles and personnel entering onto the airfield will be necessary. The airport is operated in strict compliance with Federal Aviation Regulation – Part 107 which prohibits unauthorized persons, equipment, or vehicles in the Air Operations Area. Equipment and workmen will be restricted to the work area defined on the plans. Any violation of Contractor's personnel, equipment, or vehicles will subject the Contractor to penalties imposed by the FAA Airport Operations Department. The Contractor shall maintain the security integrity between the public and Air Operations Area.

Measurement and payment for Traffic Control and Barricading will be at the lump sum contract unit price. Payment will be made based on the following provisions. Fifty percent of the payment can be made after the work area is barricaded. Thereafter, partial payments will be made monthly with 25 percent the second month and 25 percent at the conclusion of the project.

Payment will be made under:

Traffic Control & Barricading (SP-27) -- per lump sum

28. SITE SECURITY: The Contractor will contact the Airport Operations Department five (5) calendar days before the start of construction to submit the necessary airport security information for all vehicles and personnel which will be required inside the airport security fence during construction.

The Contractor shall provide adequate security and supervision to protect his/her own work and equipment.

29. AIRCRAFT SAFETY: The Contractor will be required to coordinate his work so as to satisfy clearance requirements for arrival and departure of scheduled aircraft, and in compliance with FAA Advisory Circular 150/5370-2F concerning operational safety on airports during the construction activity.

Debris Control: Contractor is working in an air operations area in which a high degree of care is

necessary to control debris and dust. Spilled material on active roadways, taxiways, runways, and aprons shall be swept up within an immediate time frame. Contractor shall be aware that the construction area is subject to jet blast which is equivalent to wind velocities of 75 to 90 miles per hour. Constant dust control measures will be required to prevent loose material from blowing across the airfield.

30. RUNWAY, TAXIWAYS AND APRONS MAINTENANCE: If the Contractor uses or his/her haul road crosses any area used by aircraft for taxiing, takeoff or parking, a power broom with non-metallic bristles and/or hand sweeping shall be used to keep this area clean of debris which would damage aircraft engines or propellers. The Contractor shall be liable for any damages that occur.

If the work is being performed adjacent to the aircraft movement areas, the Contractor shall institute a frequent dust control program to contain flying debris.

31. WORK AREA BARRICADING: The perimeters of the actual work areas shall be adequately barricaded and lighted with red obstruction clearance lights, to prevent intrusion by taxiing aircraft and vehicles. Barricade lights shall be supplemented by 2-20" x 20" orange flags at each light, installed so they are always in the extended position and properly oriented. Flag mounting brackets must be capable of securely holding the flags in position against the effects of wind and jet blast. The Contractor is required to prepare a barricade plan and to submit it to the Engineer for approval at least five (5) working days prior to commencing work at the site. Written approval of the Contractor's barricade plan is required prior to commencing work.

In addition, the contractor shall install and maintain barricades as specified above to delineate haul routes from the specified access gate across or along any apron area.

There will be no separate pay item for above noted area barricading. The cost will be included in Traffic Control & Barricading.

32. FINES: Due to the safety and security precautions necessary at Glendale Municipal Airport, failure of the Contractor to adhere to the prescribed requirements has consequences that may jeopardize the health, welfare and lives of persons using this Airport. Therefore, if the Contractor is found to be in non-compliance to the security, airfield safety and badging requirements, the Airport Operations Department may issue fines if the situation is severe enough that a verbal or written reprimand will not suffice. Appeals to the fines can be made within four days of the incident by writing to the Airport Manager. The appeal must state why the fine/circumstances is unwarranted. A final decision will then be made.

Fine Schedule:

1.	Active Runway Intrusion	$15,000.00
2.	Active Taxiway Intrusion	$10,000.00
3.	Taxiway Safety Area	$1,000.00
4.	Security Non-Compliance	
	First Offense	$1,000.00
	Second Offense	$5,000.00
	Third Offense	$15,000.00

5. Security/Driver's Permit Non-Compliance - Fine Schedule Same as 3.

6. The Operations Department has the option to issue warnings on first offense, based upon the circumstances of the incident.

7. Individuals involved in a non-compliance violation may be required to surrender their security/driver's badge pending investigation and resolution of the matter.

8. The Contractor will assume all fines against the airport assessed to them by the FAA for the Contractor's violations. Typical FAA fines are $10,000 or more per incident.

33. DAILY REPORTS: The Contractor shall complete a daily report on a form provided by the Engineer for each day work takes place on the project. The report shall indicate the personnel and equipment that worked that day and the work that was accomplished. The reports shall be turned into the Engineer on a weekly basis. An alternate form that the Contractor uses may be acceptable to the Engineer.

34. MISCELLANEOUS REMOVALS & OTHER WORK: This item shall consist of removing asphalt millings, fencing and fence posts, pipes and conduits, edge lights, cable, pullboxes, handholes, pavement, box culverts, headwalls, rip-rap, obliterating paintstriping and other miscellaneous work necessary to complete the project that involves a removal or relocation that is not specifically identified as another item of work. All removed electrical equipment shall be turned over to Glendale Municipal Airport Administration for storage. Measurement and payment for this item will be by the lump sum for all of the work complete.

Miscellaneous Removals and Other Work (SP-34) -- per lump sum

35. REMOVE AND REPLACE EXISTING FENCE: The work under this item shall include the removal and replacement of the existing fence located within the project area in accordance with MAG Uniform Standard Specifications Section 350 and 772. This item shall also include furnishing and installing new fence posts for the entire length of the removal area and furnishing and installing new poles and fence fabric as required to reinstall the fence at the proposed alignment. This item shall also include furnishing and installing temporary fencing outside of the project work area in order to maintain a full perimeter fence. The temporary fence shall be installed and the existing fence shall be removed before construction begins. Once grading is completed, the existing fence is to be replaced as shown in the plans and the temporary fence shall be removed. Payment for this item will be per lump sum

Remove And Replace Existing Fence (SP-35) -- per lump sum

36. REMOVE AND RELOCATE EXISTING 30' DOUBLE SWING GATE: The work under this item shall include the removal and replacement of the existing 30' double swing gate and signage located within the project area in accordance with MAG Uniform Standard Specifications Section 772. This item shall also include furnishing and installing temporary fencing outside of the project work area in order to maintain a full perimeter fence. The temporary fence shall be installed and the existing fence shall be removed before construction begins. Once grading is completed, the existing gate is to be relocated as shown in the plans and the temporary fence shall be removed. Payment for this item will be per lump sum

Remove And Relocate Existing 30' Double Swing Gate (SP-36) -- per lump sum

37. ADJUST LIGHTS TO FINISH GRADE: This item shall consist of adjusting the existing runway edge lights and threshold lights to proposed finish grade by installing FAA approved, hot-dipped galvanized L-867B extensions complete with new bolts and gaskets for both flanges. Replace the existing bolts and gaskets. Install new concrete ring on the extended base. Measurement and payment for this item shall be by the contract unit price per each light adjusted in place and shall include all materials, labor and equipment necessary to complete the item.

Adjust Lights to Finish Grade (SP-37) -- per each

38. SUBGRADE PREPARATION: This item shall include all excavation, fill construction, and subgrade preparation per Item P-152 of these specifications, in order to bring the construction areas to the proposed elevations (including the wind cone relocation area). Included in this item shall be all necessary over-excavation to prepare the subgrade. Measurement and payment for this item will be made at the contract unit price for the number of square yards of area scarified, processed, graded and compacted to the finished subgrade or finished elevations in accordance with the plans and specifications and accepted by the Engineer. This price shall be full compensation for all labor, materials, and equipment necessary to complete the item.

Subgrade Preparation (SP-38) -- per square yard

39. OWNER SUPPLIED SOLAR WIND SENSORS: This item shall include installing owner supplied obstruction lights and solar wind sensors (RM Young Model 05103) in accordance with the plans and in accordance with OFCM Federal Standard for Siting Meteorological Sensors at Airports, FCM-S4-1994. Work shall include furnishing and installing batteries, solar panels, poles, foundations and other incidentals necessary to complete the work.

Measurement and payment for all equipment, labor, and materials to complete this item will be made under:

Install Owner Provided Wind Sensor System (SP-39) -- per each

40. SURVEY MARKERS: This item shall include installing brass cap survey markers in accordance with MAG Uniform Standard Specifications Section 405 and Detail 120-0, type 'B'. Installation of the survey markers shall be closely coordinated with the City of Glendale Engineering Department. The Contractor shall provide any and all documentation required by the City of Glendale Engineering Department regarding the installation of the survey markers.

Measurement and payment for all equipment, labor, and materials to complete this item will be made under:

Survey Markers (SP-40) -- per each

41. TWO YEAR WARRANTY: Per the Construction Agreement, Section 3. Contractor's Work, this project shall be under warranty for a period of two years.

42. PHASING PLAN

A. Ramp Marking Phase

The ramp surfacing improvements are a Runway Safety Action Team (RSAT) recommendation. This phase consists of the obliteration of existing taxiway centerline marking to the limits of the new surface painted ramp location signs and the painting of new ramp location signs. This work shall occur during local closures of ramp connector taxiways. The contractor shall access this site from the staging area at the south west ramp connector to be named R-1. Not more than two ramp connectors shall be closed at one time to allow for adequate aircraft access to Taxiway A. The contractor shall coordinate the local closure of ramp connector taxiways with the Airport Manager, including the issuance of NOTAMs and the placement of barricades before work begins in this area. This work may be performed with local closures during the day.

B. Wind Cone Relocation Phase

This phase consists of disassembling and relocating the existing secondary wind cone, to include grading in the new wind cone location. A portion of this work is within the runway safety area and shall occur during nighttime closures of Runway 1-19. The contractor shall access this site from the staging area by way of the perimeter road. The contractor shall use flagmen or escorts to cross the portion of the perimeter road within the Runway Safety Area during periods of work outside the Runway Safety Area for which Runway 1-19 will be open. The contractor shall coordinate the nighttime closures with the Airport Manager, including the issuance of NOTAMs, the placement of lighted "X"s at ends of Runway 1-19 and the placement of barricades before work begins in this area.

C. Blast Deflector Relocation and Dust Cap Construction Phase

This phase consists of disassembling and relocating existing blast deflector fencing, and grading and paving the dust cap within the runway safety area. This work shall occur during nighttime closures of Runway 1-19. The contractor shall access this site from the staging area by way of the perimeter road. The contractor shall coordinate the nighttime closures with the Airport Manager, including the issuance of NOTAMs, the placement of lighted "X"s at ends of Runway 1-19 and the placement of barricades before work begins in this area.

D. Blast Pad Phase

This phase consists of the construction of blast pads at each end of Runway 1-19. This work shall occur during nighttime closure of Runway 1-19. The contractor shall coordinate the nighttime closures with the Airport Manager, including the issuance of NOTAMs, the placement of lighted "X"s at ends of Runway 1-19 and the placement of barricades before work begins in this area. No sudden "drop-offs" shall be left in place adjacent to the runway edges. At the conclusion of each night's work, and prior to re-opening the runway, the Contractor shall construct temporary ramps from the pavement edge to the existing grade at a slope no greater than 5%.

Night time closures will be between 8:30 PM and 5:30 AM.

43. ADJUST EXISTING PULLBOX TO FINISH GRADE: This item shall consist of removing, salvaging and replacing existing pullboxes to finished grade. Included in this item is all conduit, conductor, connectors, ground wire and counterpoise cable necessary to complete this item. Measurement and payment will include all labor, materials, time and equipment required to complete this item.

Adjust Pullbox to Finish Grade (SP-43) -- per each

END OF SPECIAL PROVISIONS

SUPPLEMENTAL SPECIFICATIONS

SECTION 12 BLAST DEFLECTOR FENCE

DESCRIPTION

12-1 Work covered by this section of the specifications consists of providing all plant, labor, equipment, appliances, obstruction lights, and materials, and for performing all operations required to cover the removal and relocation of two existing 12 foot nominal height Blast Deflector Fence. Deflector shall be designed for loading of 50 PSF or velocities of 140 MPH, and shall be capable of deflecting entire blast envelope upwards at a minimum angle of 60 degrees under no wind conditions.

MATERIALS

12-2 GENERAL. The existing blast deflector is Lynnco Type G-14NB-6 as manufactured by Blast Deflectors, Inc., Watsonville, California. The deflector is constructed of the curved, non-perforated, galvanized, corrugated type, with corrugations running in a horizontal direction.

12-3 BLAST DEFLECTOR CONSTRUCTION. Structural frames which support the deflecting surface are structural shapes, rolled, punched and prefabricated for bolting together at site. Deflecting surface is galvanized corrugated steel with minimum of 2 oz. zinc coating per Fed. Spec. WW-P-00405. Sheets should have a section modulus of not less than 0.0163 inches cubed per inch and should be of corrosion resistant steel with yield point in 50,000 psi range.

All bolts subject to blast temperatures shall be of SAE 1038 steel, heat treated. All nuts, except on anchor bolts, shall be of the all-steel, self-locking type.

12-4 BLAST DEFLECTOR ANCHORAGE. The Contractor shall be responsible for submitting shop drawings and supporting calculations for footings for the blast deflector. Lynnco Spec. AB-34M "Epoxy-Locked" anchors or approved equal may be used, provided that they are installed by or under the supervision of deflector manufacturer, who shall be responsible for guaranteeing the integrity of the anchorage system.

12-5 BLAST DEFLECTOR ASSEMBLY. All components shall be assembled by bolting together with flat washers, under bolt heads, and half oval washers between nuts and corrugated sheets. Welding, brazing or burning of holes is not permitted. All nuts and bolts will be tightened to torques specified by manufacturer.

12-6 BLAST DEFLECTOR FINISH. All bolts, nuts and washers, shall be cadmium or zinc plated. All structural members, parts, and corrugated metal shall be hot dip galvanized with a minimum coating of 2.0 oz. zinc per square foot of surface. Any galvanized surface badly scratched or marred, shall be regalvanized or repaired to the satisfaction of the Engineer.

12-7 OBSTRUCTION LIGHTS. Single L-810 obstruction lights shall be placed at the top of the blast deflector fence as shown on the plans and in accordance with FAA requirements and Manufacturer's plans and specifications. The lamps for these lights are to be wired in parallel on a dedicated circuit.

No separate measurement or payment will be made for this item, the cost of which will be considered

incidental to the cost of the blast deflector fence.

12-8 GROUNDING. Grounding of the blast deflectors shall be in accordance with the manufacturer's recommendations and the local electrical code.

12-9 DELETED.

12-10 BLAST DEFLECTOR AND ANCHORAGE SHOP DRAWINGS. The Contractor shall submit shop drawings to the Engineer for approval. The Contractor will be held responsible for all errors in fabrication, and for the structural integrity of the blast deflector and the footings.

METHODS OF MEASUREMENT

12-11. Blast deflector fence installed shall be measured per lump sum of blast fence removed and reinstalled, ready for operation, and accepted as satisfactory. No separate measurement or payment will be made for the footings, grounding, electrical, pull boxes, cable, conduit, obstruction lights, and foundation of the blast deflector fence.

BASIS OF PAYMENT

12-12. Payment will made at the contract unit price per lump sum. The price shall be full compensation for furnishing all materials, and for all preparation, erection, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Disassemble, Salvage, and Relocate existing Blast Deflectors on New Anchorage (SS-12)	-- per lump sum

SECTION 13 SOIL STERILANT

DESCRIPTION

13.1 This item consists of application of a soil sterilant to the apron subgrade in accordance with these specifications and the locations shown in the Plans.

MATERIALS

13.2 The soil sterilant shall be Pramitol 25E as manufactured by Elanco Chemical Co. or an approved equal. The use of Pramitol 25E is intended to establish a level of performance only and the use of other commercial products such as Fenamine, Triflorin and Spike 80W applied at the rates recommended by the manufacturer, which can be demonstrated to achieve or exceed the results of Pramitol 25E, will be permitted.

CONSTRUCTION METHODS

13.3 After the base course has been completed and approved, the soil sterilant shall be applied to the compacted aggregate base course. The sterilant shall be dissolved in water and applied as a solution in accordance with the Manufacturer's recommendations. The concentration of the solution and application rate shall be in accordance with the manufacturer's recommendations.

The application of the prime coat to the base course surface shall follow the application of the soil sterilant in accordance with the manufacturer's recommendations.

METHOD OF MEASUREMENT

13.4 Soil sterilant will be measured to the nearest square yard of area treated as specified.

BASIS OF PAYMENT

13.5 Payment will be made at the contract unit price per square yard for soil sterilant. This payment will be full compensation for furnishing all materials and for all preparation, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Soil Sterilant (SS-13)	-- per square yard

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SECTION L-107 AIRPORT 8-FOOT WIND CONES

DESCRIPTION

107-1.1 This item shall consist of removing and relocating an airport wind cone in accordance with these specifications and in accordance with the dimensions, design, and details shown in the plans.

The work shall include the furnishing and installation of a support for mounting the wind cone, the specified wire, and a concrete foundation. The item shall also include all cable connections, conduit and conduit fittings, the furnishing and installation of all lamps, ground rod and ground connection, the testing of the installation, and all incidentals necessary to place the wind cone in operation as a completed unit to the satisfaction of the Engineer.

EQUIPMENT AND MATERIALS

107-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified and listed under Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor's submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least [twelve (12) months] from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner.

107-2.2 WIND CONES. The 8-foot (240 cm) and 12-foot (3.5 m) wind cones and assemblies shall conform to the requirements of AC 150/5345-27, Specification for Wind Cone Assemblies. Wind cones shall be Type L-807, Style 1-B, Size 2.

107-2.3 WIRE. Wire in conduit rated up to 5,000 volts shall conform to AC 150/5345-7, Specification for L-824 Underground Cable for Airport Lighting Circuits for Rubber Insulated Neoprene Covered Wire, or Fed. Spec. J-C-30, Type RHW, for rubber insulated fibrous covered wire. For ratings up to 600 volts, thermoplastic wire conforming to Fed. Spec. J-C-30, Types TW, THW, and THWN, shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the plans or in the proposal.

107-2.4 CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of Underwriters Laboratories Standard 6, 514, and 1242.

107-2.5 PLASTIC CONDUIT (for use below grade only). Plastic conduit and fittings-shall conform to the requirements of Fed. Spec. W--C-1094 and Underwriters Laboratories Standards UL-651 and shall be one of the following, as shown in the plans:

a. Type I–Schedule 40 PVC suitable for underground use either direct-buried or encased in concrete.

Plastic conduit adhesive shall be a solvent cement manufactured specifically for the purpose of gluing the specific type of plastic conduit and fitting.

107-2.6 CONCRETE. The concrete for foundations shall be proportioned, placed, and cured in accordance with Item P-610, Structural Portland Cement Concrete.

107-2.7 PAINT.

a. Priming paint for ungalvanized metal surfaces shall be a high solids alkyd primer conforming to TT-P-664D.

b. Priming paint for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-DTL-24441/19B. If necessary, add not more than ½ pint (0.06 liter) of turpentine to each gallon (liter).

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint meeting the requirements of Fed. Spec. TT-E-489. The color shall be in accordance with Federal Standards 595, Aviation Gloss Orange Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the Master Painter's Institute, Reference #9, Exterior Alkyd, Gloss, VOC Range E2.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above specified aviation-orange or white paint by adding ½ pint (0.06 liter) of raw linseed oil to each gallon (liter).

CONSTRUCTION METHODS

107-3.1 INSTALLATION. The hinged support or hinged pole shall be installed on a concrete foundation designed by an Arizona licensed structural engineer. Signed and sealed shop drawings shall be submitted to the Engineer for approval.

107-3.2 POLE ERECTION. The Contractor shall erect the pole on the foundation following the manufacturer's requirements and erection details. The pole shall be level and secure.

107-3.3 ELECTRICAL CONNECTION. The Contractor shall furnish all labor and materials and shall make complete electrical connections in accordance with the wiring diagram furnished with the project plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electric Code.

If underground cable from the transformer vault to the wind cone site and duct for this cable installation is required, the cable and duct shall be installed in accordance with and paid for as described in Item L-108, Underground Power Cables for Airports, and Item L-110, Airport Underground Electrical Duct Banks and Conduits.

107-3.4 STEP DOWN TRANSFORMER. The existing step down transformer shall be relocated and installed in accordance with the plans and specifications, and accepted by the Engineer. No separate measurement or payment will be made for relocating the step down transformer. This work shall be considered incidental to the relocation of the wind cone assembly.

107-3.5 GROUND CONNECTION AND GROUND ROD. The Contractor shall furnish and install a ground rod, grounding cable, and ground clamps for grounding the "A" frame of the 12-foot (3.5 m) assembly support near the base. The ground rod shall be of the type, diameter and length specified in Item L-108, Underground Power Cable for Airports. The ground rod shall be driven into the ground adjacent to the concrete foundation (minimum distance from foundation of 2 feet) so that the top is at least 6 inches (150 mm) below grade. The grounding cable shall consist of No. 4 AWG minima bare stranded copper wire or larger and shall be firmly attached to the ground rod by exothermic welding. The other end of the grounding cable shall be securely attached to a leg of the frame or to the base of the pipe support with non-corrosive metal and shall be of substantial construction. The resistance to ground shall not exceed 25 ohms.

107-3.6 PAINTING. Three coats of paint shall be applied (one prime, one body, and one finish) to all exposed material installed under this item except the fabric cone, obstruction light globe, and lamp reflectors. The wind cone assembly, if painted on receipt, shall be given one finish coat of paint in lieu of the three coats specified above. The paint shall meet the requirements of Fed. Spec. TT-E-489. The color shall be in accordance with Federal Standard 595, Aviation Gloss Orange Number 12197.

107-3.7 LAMPS. The Contractor shall furnish and install lamps as specified by the manufacturer.

METHOD OF MEASUREMENT

107-4.1 The quantity of relocate existing windcone shall be paid on a lump sum basis for relocating the windcone in accordance with the specifications and accepted by the Engineer.

BASIS OF PAYMENT

107-5.1 Payment will be made at the contract lump sum price for completed and accepted windcone relocation. This price shall be full compensation for furnishing all materials and for all preparation,

assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-107	Relocate Existing Windcone - lump sum

MATERIAL REQUIREMENTS

AC 150/5345-7	Specification for L-824 Underground Cable for Airport Lighting Circuits
AC 150/5345-27	Specification for Wind Cone Assemblies
FED SPEC TT-E-489	Enamel, Alkyd, Gloss, Low VOC Content
FED SPEC J-C-30	Cable and Wire, Electrical (Power, Fixed Installation) (cancelled; replaced by AA-59544 Cable and Wire, Electrical (Power, Fixed Installation))
FED SPEC W-P-115	Panel, Power Distribution
FED STD 595	Colors Used in Government Procurement
MIL-DTL-24441/20	Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type III
Underwriters Laboratories Standard 6	Rigid Metal Conduit
Underwriters Laboratories Standard 514	Fittings For Conduit and Outlet Boxes
Underwriters Laboratories Standard 1242	Intermediate Metal Conduit
NFPA-70	National Electric Code
Master Painter's Institute	

SECTION P-151 CLEARING AND GRUBBING

DESCRIPTION

151-1.1 This item shall consist of clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Engineer.

Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing by burning or otherwise.

CONSTRUCTION METHODS

151-2.1 GENERAL. The areas denoted on the plans to be cleared and grubbed shall be staked on the ground as directed by the Engineer. The clearing and grubbing shall be done at a satisfactory distance in advance of the grading operations.

All spoil materials removed by clearing and grubbing shall be disposed of by removal to approved disposal areas.

As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed in accordance with requirements for formation of embankments. Any broken concrete or masonry which cannot be used in construction and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits at his/her own expense, he shall obtain and file with the Engineer, permission in writing from the property owner for the use of private property for this purpose.

If the plans or the specifications require the saving of merchantable timber, the Contractor shall trim the limbs and tops from designated trees, saw them into suitable lengths, and make the material available for removal by other agencies.

Any blasting necessary shall be done at the Contractor's responsibility, and the utmost care shall be taken not to endanger life or property.

The removal of existing structures and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone or telegraph pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated the Contractor shall advise the Engineer who will notify the proper local authority or owner and attempt to secure prompt action.

151-2.2 CLEARING AND GRUBBING. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where

embankments exceeding 3-1/2 feet in depth are to be made outside of paved areas. In cases where such depth of embankments is to be made, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off within 6 inches above the ground and allowed to remain. Tap roots and other projections over 1-1/2 inches in diameter shall be grubbed out to a depth of at least 18 inches below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the plans to be removed shall be demolished or removed, and all materials therefrom shall be disposed of either by burning or otherwise removed from the site. The remaining or existing foundations, wells, cesspools, and all like structures shall be destroyed by breaking out or breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material which cannot be used in backfill shall be removed and disposed of. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be filled with acceptable material, moistened and properly compacted in layers to the density required in Item P-152. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-3.1 The quantities of clearing and grubbing as shown by the limits on the plans or as ordered by the Engineer shall be the number of acres or fractions thereof, of land specifically cleared or cleared and grubbed.

BASIS OF PAYMENT

151-4.1 Payment shall be made at the contract unit price per acre for clearing and grubbing. 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:

Clearing & Grubbing (P-151) -- per acre

SECTION P-152 EXCAVATION AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct runway safety areas, runways, taxiways, aprons, and intermediate as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical section shown on the plans.

152-1.2 CLASSIFICATION. All material excavated shall be classified as defined below:

a. Unclassified Excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature.

152-1.3 Unsuitable Excavation. Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, when approved by the Engineer as suitable to support vegetation, may be used on the embankment slope.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the Engineer. All unsuitable material shall be disposed of off the airport property.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued. At the direction of the Engineer, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Those areas outside of the pavement areas in which the top layer of soil material has become compacted, by hauling or other activities of the Contractor shall be scarified and disked to a depth of 4 inches, in order to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Engineer, who shall arrange for their removal if necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures which may result from any of the Contractor's operations during the period of the contract.

152-2.2 EXCAVATION. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall be disposed of off the airport property.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be disposed of off the airport property. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the deficiency shall be obtained from borrow areas.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the work.

No separate payment will be made for excavation.

a. Selective Grading. When selective grading is indicated on the plans, the more suitable material as designated by the Engineer shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas for later use.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for runway safety areas, subgrades, roads, shoulders, or any areas intended for turfing shall be excavated to a minimum depth of 12 inches, or to the depth specified by the Engineer, below the subgrade. Muck, peak, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. The excavated area shall be refilled with suitable material, obtained from the grading operations or borrow areas and thoroughly compacted by rolling. The necessary refilling will constitute a part of the embankment. Where rock cuts are made and refilled with selected material, any pockets created in the rock surface shall be ditched at frequent intervals to provide adequate drainage.

c. Overbreak. Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Engineer. The Engineer shall determine if the displacement of such material was unavoidable and his/her decision shall be final. All overbreak shall be graded or removed by the Contractor and disposed of as directed; however, payment will not be made for the removal and disposal of overbreak which the Engineer determines as avoidable.

d. Removal of Utilities. The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by someone other than the Contractor, e.g., the utility unless otherwise shown on the plans. All existing foundations shall be excavated for at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed. All foundations thus excavated shall be backfilled with suitable material and compacted as specified herein.

e. Compaction Requirements. The subgrade under areas to be paved shall be compacted to a depth of 6 inches and to a density of not less than 100 percent of the maximum density and at a moisture content within 2 percent of optimum moisture in accordance with ASTM D 698.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. Stones or rock fragments larger than 4 inches in their greatest dimension will not be permitted in top 6 inches of the subgrade. The finished grading operations, conforming to the typical cross section, shall be completed and maintained at least 1,000 feet ahead of the paving operations or as directed by the Engineer.

In cuts, all loose or protruding rocks on the back slopes shall be bared loose or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the plans or as directed by the Engineer. Blasting will not be permited.

152-2.3 DRAINAGE EXCAVATION. Drainage excavation shall consist of excavating for drainage ditches such as intercepting, inlet or outlet, for temporary levee construction; or for any other type as designed or as shown on the plans. The work shall be performed in the proper sequence with the other construction. All satisfactory material shall be placed in fills; unsuitable material shall be placed in waste areas or as directed. Intercepting ditches shall be constructed prior to starting adjacent excavation operations. All necessary work shall be performed to secure a finish true to line, elevation, and cross section.

The Contractor shall maintain ditches constructed on the project to the required cross section and shall keep them free of debris or obstructions until the project is accepted.

No separate payment will be made for ditch excavation.

152-2.4 PREPARATION OF EMBANKMENT AREA. Where an embankment is to be constructed to a height of 4 feet or less, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken up by plowing or scarifying to a minimum depth of 6 inches. This area shall then be compacted as indicated in paragraph 2.5. When the height of fill is greater than 4 feet, sod not required to be removed shall be thoroughly disked and recompacted to the density of the surrounding ground before construction of embankment.

Where embankments are to be placed on natural slopes steeper than 3 to 1, horizontal benches shall be constructed as shown on the plans.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing will be paid for under the respective item of work.

152-2.5 FORMATION OF EMBANKMENTS. Embankments shall be formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross section, unless otherwise approved to the Engineer.

The grading operations shall be conducted, and the various soil strata shall be placed, to produce a soil structure as shown on the typical cross section or as directed. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

The material in the layer shall be within 2 percent of optimum moisture content before rolling to obtain the prescribed compaction. In order to achieve a uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be required when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Sprinkling of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times.

Samples of all embankment materials for testing, both before and after placement and compaction, will be taken at a rate of 1 per each 500 L.F. for each lift. Based on these tests, the Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content in order to achieve the correct embankment density.

Rolling operations shall be continued until the embankment is compacted to not less than 100 percent of maximum density as determined by ASTM D-698. Under all areas to be paved, the embankments shall be compacted to a depth of 6 inches and to a density of not less than 100 percent of the maximum density as determined by ASTM D-698.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167.

Compaction areas shall be kept separate, and no layer shall be covered by another until the proper density is obtained.

During construction of the embankment, the Contractor shall route his/her equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of embankments, layer placement shall begin in the deepest portion of the fill; as placement progresses, layers shall be constructed approximately parallel to the finished pavement grade line.

When rock and other embankment material are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated under the future paved areas. Stones or fragmentary rock larger than 3 inches in their greatest dimensions will not be allowed in the top 12 inches of the subgrade. Rockfill shall be brought up in layers as specified or as directed and every effort shall be exerted to fill the voids with the finer material forming a dense, compact mass. Rock or boulders shall not be disposed of outside the excavation or embankment areas, except at places and in the manner designated by the Engineer.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in layers of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in layers not exceeding 2 feet in thickness. Each layer shall be leveled and smoothed with suitable leveling equipment and by distribution of spalls and finer fragments of rock. These type lifts shall not be constructed above an elevation 4 feet below the finished subgrade. Density requirements will not apply to portions of embankments constructed of materials which cannot be tested in accordance with specified methods.

Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material.

152-2.6 FINISHING AND PROTECTION OF SUBGRADE. After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unstable material which will not compact properly. The resulting areas and all other low areas, holes or

depressions shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans.

Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. He/she shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts or rough places that develop in a completed subgrade shall be smoothed and recompacted.

No subbase, base or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer.

152-2.7 HAUL. All hauling will be considered a necessary and incidental part of the work. Its cost shall be considered by the Contractor and included in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

152-2.8 TOLERANCES. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 16-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2-inch, or shall not be more than 0.05-foot from true grade as established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by sprinkling and rolling.

On runway safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

METHOD OF MEASUREMENT AND BASIS OF PAYMENT

No separate measurement or payment shall be made for Excavation or Embankment, the cost of which shall be considered incidental to Subgrade Preparation.

TESTING REQUIREMENTS

ASTM D 698	Tests for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound Rammer and 12-inch Drop
ASTM D 1556	Test for Density of Soil In-Place by the Sand Cone Method
ASTM D 1557	Tests for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 10-pound Rammer and 18-inch Drop
ASTM D 2167	Test for Density of Soil In-Place by the Rubber Balloon Method.

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SECTION P-209 CRUSHED AGGREGATE BASE COURSE

DESCRIPTION

209-1.1 This item consists of a base course for the Apron Expansion, composed of crushed aggregates constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

MATERIALS

209-2.1 AGGREGATE. Aggregates shall consist of clean, sound, durable particles of crushed stone, crushed gravel, or crushed slag and shall be free from coatings of clay, silt, vegetable matter, and other objectionable materials and shall contain no clay balls. Fine aggregate passing the No. 4 sieve shall consist of fines from the operation of crushing the coarse aggregate. If necessary, fine aggregate may be added to produce the correct gradation. The fine aggregate shall be produced by crushing stone, gravel, or slag that meet the requirements for wear and soundness specified for coarse aggregate.

The crushed slag shall be an air-cooled, blast furnace slag and shall have a unit weight of not less than 70 pounds per cubic foot when tested in accordance with ASTM C 29.

The crushed aggregate portion which is retained on the No. 4 sieve shall contain not more than 15 percent, by weight, of flat or elongated pieces as defined in ASTM D 693 and shall have at least 90 percent by weight of particles with at least two fractured faces and 100 percent with at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 to count as two fractured faces.

The percentage of wear shall not be greater than 45 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, after 5 cycles, when tested in accordance with ASTM C 88. The use of volcanic cinders shall not be permitted.

The fraction passing the No. 40 sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 4 when tested in accordance with ASTM D 4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested in accordance with ASTM D 2419.

a. Sampling and Testing. Aggregates for preliminary testing shall be furnished by the Contractor prior to the start of production. All tests for initial aggregate submittals necessary to determine compliance with the specification requirements will be made by the Engineer at no expense to the Contractor.

Samples of aggregates shall be furnished by the Contractor at the start of production and at intervals during production. The sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval of specific lots of aggregates from the standpoint of the quality requirements of this section.

In lieu of testing, the Engineer may accept certified state test results indicating that the aggregate meets specification requirements. Certified test results shall be less than 6 months old.

Samples of aggregates to check gradation shall be taken by the Engineer at least twice per lot. The lot will be consistent with acceptance sampling for density. Sampling shall be in accordance with ASTM D 75, and

testing shall be in accordance with ASTM C 136 and C 117.

b. Gradation Requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in Table 1, when tested in accordance with ASTM C 117 and C 136. The final gradation shall be continuously well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

TABLE 1. REQUIREMENTS FOR GRADATION OF AGGREGATE

Sieve Size	Design Range Percentage by Weight Passing Sieves	Job Mix Tolerances Percent
2 In.	100	
1-1/2 In.	95-100	+/-5
1 In.	70-95	+/-8
¾ In.	55-85	+/-8
No. 4	30-60	+/-8
No. 30	12-30	+/-5
No. 200	0-8	+/-3

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control grading band. The full tolerance still will apply if application of the tolerances results in a job control grading band outside the design range.

The fraction of the final mixture that passes the No. 200 sieve shall not exceed 60 percent of the fraction passing the No. 30 sieve.

CONSTRUCTION METHODS

209-3.1 PREPARING UNDERLYING COURSE. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon. Material shall not be placed on frozen subgrade or subbase.

209-3.2 MIXING. The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

209-3.3 PLACING. The crushed aggregate base material shall be placed on the moistened subgrade or subbase in layers of uniform thickness with a mechanical spreader.

The maximum depth of a compacted layer shall be 6 inches. If the total depth of the compacted material is more than 6 inches, it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.

The previously constructed layer should be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

209-3.4 COMPACTION. Immediately upon completion of the spreading operations, the crushed aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

The moisture content of the material during placing operations shall not be below, nor more than 2 percentage points above, the optimum moisture content as determined by ASTM D-1557.

209-3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 square yards. A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 square yards.

Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.

Each lot will be accepted for density when the field density is at least 100 percent of the maximum density of laboratory specimens prepared from samples of the base course material delivered to the job site. The specimens shall be compacted and tested in accordance with ASTM D-1557. The in-place field density shall be determined in accordance with ASTM D 1556 or D 2167. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

In lieu of the core method of field density determination, acceptance testing may be accomplished using a nuclear gage in accordance with ASTM D 6938. The gage should be field calibrated in accordance with Section 120 of the FAA General Provisions and ASTM standards. Calibration tests shall be conducted on the first lot of material placed that meets the density requirements.

When using the nuclear method ASTM D 6938 shall be used to determine the moisture content of the material. The calibration curve furnished with the nuclear gauges shall be checked in accordance with ASTM standards. The calibration checks shall be made at the beginning of a job and at regular intervals.

If a nuclear gage is used for density determination, two random readings shall be made for each sublot.

209-3.6 FINISHING. The surface of the aggregate base course shall be finished by blading or with automated equipment especially designed for this purpose.

In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 inch or more below grade, the top layer of base shall be scarified to a depth of at least 3 inches, new material added, and the layer shall be blended and recompacted to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled.

209-3.7 SURFACE TOLERANCES. The finished surface shall not vary more than 3/8 inch when tested with a 16-foot straightedge applied parallel with or at right angles to the centerline. Any deviation in excess of this amount shall be corrected by the Contractor at the Contractor's expense. Contractor shall notify the Engineer at least 48 hours prior to the need for survey checks.

209-3.8 THICKNESS CONTROL. The completed thickness of the base course shall be within 1/2 inch of the design thickness. Four determinations of thickness shall be made for each lot of material placed. The lot size shall be consistent with that specified in paragraph 3.5. Each lot shall be divided into four equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Where the thickness is deficient by more than 1/2 inch, the Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

209-3.9 MAINTENANCE. The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

METHOD OF MEASUREMENT

209-4.1 The quantity of crushed aggregate base course to be paid for will be determined by measurement of the number of square yards of material actually constructed and accepted by the Engineer as complying with the plans and specifications.

BASIS OF PAYMENT

209-5.1 Payment shall be made at the contract unit price per square yard for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209	6" Crushed Aggregate Base Course	-- per square yard

TESTING REQUIREMENTS

ASTM C 29	Unit Weight of Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM D 75	Sampling Aggregate
ASTM D 693	Crushed Stone, Crushed Slag, and Crushed Gravel for Dry-or Water-Bound Macadam Base Courses and Bituminous Macadam Base and Surface Courses of Pavements.

ASTM D 698	Moisture-Density Relations of Soils and Soil - Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12-in (305mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand - Cone Method
ASTM D 1557	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.5kg) Rammer and 18 in (457 mm) Drop
ASTM D 2167	Density of Soil in Place by the Rubber-Ballon Method
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2922	Density of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3017	Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index

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SECTION P-403 PLANT MIX BITUMINOUS PAVEMENTS

DESCRIPTION

403-1.1 This item shall consist of a surface course composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

403-2.1 AGGREGATE. Aggregates shall consist of crushed stone, crushed gravel, or crushed slag with or without natural sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 4 sieve is coarse aggregate. The portion passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate, and the portion passing the No. 200 sieve is mineral filler.

a. Coarse Aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating and bonding with the bituminous material and be free from organic matter and other deleterious substances. The percentage of wear shall not be greater than 40 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 10 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88.

Aggregate shall contain at least 50 percent by weight of individual pieces having two or more fractured faces and 65 percent by weight having at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be obtained by crushing.

The aggregate shall not contain more than a total of 8 percent, by weight, of flat particles, elongated particles, and flat and elongated particles, when tested in accordance with ASTM D 4791 with a value of 5:1.

b. Fine Aggregate. Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

Natural (nonmanufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification. The fine aggregate shall not contain more than 15 percent natural sand by weight of total aggregates. If used, the natural sand shall meet the requirements of ASTM D 1073 and shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.
The aggregate shall have sand equivalent values of 45 or greater when tested in accordance with ASTM D 2419.

c. Sampling. ASTM D 75 shall be used in sampling coarse and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler.

403-2.2 MINERAL FILLER. If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242.

403-2.3 BITUMINOUS MATERIAL. Bituminous material shall conform to the following requirements: PG 70-10 in accordance with AASHTO MP1-93, Specification for Performance Graded Asphalt Binder.

The Contractor shall furnish vendor's certified test reports for each lot of bituminous material shipped to the project. The vendor's certified test report for the bituminous material can be used for acceptance or tested independently by the Engineer.

403-2.4 PRELIMINARY MATERIAL ACCEPTANCE. Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

a. Coarse Aggregate.
- **(1)** Percent of wear.
- **(2)** Soundness.
- **(3)** Unit weight of slag.
- **(4)** Percent Fractured Faces.

b. Fine Aggregate.
- **(1)** Liquid limit.
- **(2)** Plasticity index.
- **(3)** Sand equivalent.

c. Mineral Filler.

d. Bituminous Material. Test results for bituminous material shall include temperature/viscosity charts for mixing and compaction temperatures.

The certification(s) shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

403-2.5 ANTI-STRIPPING AGENT. Any anti-stripping agent or additive if required shall be heat stable, shall not change the asphalt cement viscosity beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method, and shall be a material approved by the Department of Transportation of the State in which the project is located.

COMPOSITION

403-3.1 COMPOSITION OF MIXTURE. The bituminous plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and bituminous material. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

403-3.2 JOB MIX FORMULA. No bituminous mixture for payment shall be produced until a job mix formula has been approved in writing by the Engineer. The bituminous mixture shall be designed using procedures contained in Chapter 5, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete, sixth edition, and shall meet the requirements of Tables 1, 2 and 3.

Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867, shall not be less than 75. Anti-stripping agent shall be added to the asphalt, as necessary, to produce a TSR of not less than 75. If an antistrip agent is required, it will be provided by the Contractor at no additional cost to the Owner.

The job mix formula shall be submitted in writing by the Contractor to the Engineer at least 10 days prior to the start of paving operations and shall include as a minimum:

a. Percent passing each sieve size for total combined gradation, individual gradation of all aggregate stockpiles and percent by weight of each stockpile used in the job mix formula.

b. Percent of asphalt cement.

c. Asphalt performance, viscosity or penetration grade.

d. Number of blows of hammer compaction per side of molded specimen.

e. Mixing temperature.

f. Compaction temperature.

g. Temperature of mix when discharged from the mixer.

h. Temperature-viscosity relationship of the asphalt cement.

i. Plot of the combined gradation on the Federal Highway Administration (FHWA) 45 power gradation curve.

j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content.

k. Percent natural sand.

l. Percent fractured faces.

m. Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).

n. Tensile Strength Ratio (TSR).

o. Antistrip agent (if required).

The Contractor shall submit to the Engineer the results of verification testing of three (3) asphalt samples prepared at the optimum asphalt content. The average of the results of this testing shall indicate conformance with the job mix formula requirements specified in Tables 1, 2 and 3.

When the project requires asphalt mixtures of differing aggregate gradations, a separate job mix formula and the results of job mix formula verification testing must be submitted for each mix.

The job mix formula for each mixture shall be in effect until a modification is approved in writing by the Engineer. Should a change in sources of materials be made, a new job mix formula must be submitted within 10 days and approved by the Engineer in writing before the new material is used. After the initial production job mix formula(s) has/have been approved by the Engineer and a new or modified job mix formula is required for whatever reason, the subsequent cost of the Engineer's approval of the new or modified job mix formula will be borne by the Contractor. There will be no time extension given or considerations for extra costs associated with the stoppage of production paving or restart of production paving due to the time needed for the Engineer to approve the initial, new or modified job mix formula.

TABLE 1. MARSHALL DESIGN CRITERIA

TEST PROPERTY	Pavements Designed for Aircraft Gross Weights of 60,000 Lbs. or More or Tire Pressures of 100 Psi or More
Number of blows	75
Stability, pounds minimum	1800
Flow, 0.01 in. (0.25 mm)	8-16
Air voids (percent)	2-5
Percent voids in mineral aggregate, minimum	See Table 2

TABLE 2. MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE

Maximum Particle Size		Minimum Voids in Mineral Aggregate, percent
in.	mm	Percent
¾	19.0	15

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 3 when tested in accordance with ASTM C 136 and C 117.

The gradations in Table 3 represent the limits that shall determine the suitability of aggregate for use from the sources of supply. The aggregate, as selected (and used in the JMF), shall have a gradation within the limits designated in Table 3 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be well graded from coarse to fine.

Deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the action limits for individual measurements as specified in paragraph 403-6.5a. The limits still

will apply if they fall outside the master grading band in Table 3.

The maximum size aggregate used shall not be more than one-half of the thickness of the course being constructed except where otherwise shown on the plans or ordered by the Engineer.

TABLE 3. AGGREGATE - BITUMINOUS PAVEMENTS

Sieve Size	Percentage by Weight Passing Sieve
1-½ in.	--
1 in.	--
¾ in.	100
½ in.	79-99
⅜ in.	68-88
No. 4	48-68
No. 8	33-53
No. 16	20-40
No. 30	14-30
No. 50	9-21
No. 100	6-16
No. 200	3-6
Asphalt percent Stone or gravel	5.0-7.5

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute Manual Series No. 2 (MS-2), Chapter 3.

403-3.3 RECYCLED ASPHALT CONCRETE. Recycled HMA, consisting of reclaimed asphalt pavement (RAP), will not be permitted.

403-3.4 TEST SECTION. Prior to full production, the Contractor shall prepare and place a quantity of bituminous mixture according to the job mix formula. The amount of mixture shall be sufficient to construct a test section 300 feet long and 20 feet wide, placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. A cold joint is an exposed construction joint at least 4 hours old or whose mat has cooled to less than 160°F. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

The test section shall be evaluated for acceptance as a single lot in accordance with the acceptance criteria in paragraph 403-5.1 and 403-6.3. The test section shall be divided into equal sublots. As a minimum the test section shall consist of 3 sublots.

The test section shall be considered acceptable if the average mat density of the test section cores is greater than or equal to 98 percent and the average joint density of the test section cores is greater than or equal to 95 percent. If the initial test section should prove to be unacceptable, the necessary

adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable section has been constructed and accepted in writing by the Engineer. Once an acceptable test section has been placed, payment for the initial test section and the section that meets specification requirements shall be made in accordance with paragraph 403-8.1.

Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the job mix formula. If the aggregates produced by the plant do not satisfy the gradation requirements or produce a mix that meets the JMF, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens shall be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

403-3.5 TESTING LABORATORY. The Contractor's laboratory used to develop the job mix formula shall meet the requirements of ASTM D 3666 including the requirement to be accredited by a national authority such as the National Voluntary Laboratory Accreditation Program (NVLAP), the American Association for Laboratory Accreditation (AALA), or AASHTO Accreditation Program (AAP). A certification signed by the manager of the laboratory stating that it meets these requirements shall be submitted to the Engineer prior to the start of construction. The certification shall contain as a minimum:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

e. ASTM D 3666 certification of accreditation by a nationally recognized accreditation program.

CONSTRUCTION METHODS

403-4.1 WEATHER LIMITATIONS. The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

TABLE 4. BASE TEMPERATURE LIMITATIONS

Mat Thickness	Base Temperature (Minimum)	
	Deg. F	Deg. C
3 in. or greater	40	4
Greater than 1 in. but less than 3 in.	45	7
1 in. or less	50	10

403-4.2 BITUMINOUS MIXING PLANT. Plants used for the preparation of bituminous mixtures shall conform to the requirements of ASTM D 995 with the following changes:

a. Requirements for All Plants.

(1) Truck Scales. The bituminous mixture shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of the General Provisions, subsection 9.

In lieu of scales, and as approved by the Engineer, asphalt mixture weights may be determined by the use of an electronic weighing system equipped with an automatic printer that weighs the total paving mixture. Contractor must furnish calibration certification of the weighing system prior to mix production and as often thereafter as requested by the Engineer.

(2) Testing Facilities. The Contractor shall provide laboratory facilities at the plant for the use of the Engineer's acceptance testing and the Contractor's quality control testing. The Engineer will always have priority in the use of the laboratory. The lab shall have sufficient space and equipment so that both testing representatives (Engineer's and Contractor's) can operate efficiently. The lab shall also meet the requirements of ASTM D 3666.

The plant testing laboratory shall have a floor space area of not less than 150 square feet, with a ceiling height of not less than 7-½ feet. The laboratory shall be weather tight, sufficiently heated in cold weather, air-conditioned in hot weather to maintain temperatures for testing purposes of 70 degrees F +/- 5 degrees F. The plant testing laboratory shall be located on the plant site to provide an unobstructed view, from one of its windows, of the trucks being loaded with the plant mix materials.

Laboratory facilities shall be kept clean, and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor's laboratory facility and witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

As a minimum, the plant testing laboratory shall have:

(a) Adequate artificial lighting
(b) Electrical outlets sufficient in number and capacity for operating the required testing equipment and drying samples.
(c) Fire extinguishers (2), Underwriter's Laboratories approved
(d) Work benches for testing, minimum 2-½ feet by 10 feet.
(e) Desk with 2 chairs
(f) Sanitary facilities convenient to testing laboratory
(g) Exhaust fan to outside air, minimum 12 inch blade diameter
(h) A direct telephone line and telephone including a FAX machine operating 24 hours per day, seven days per week
(i) File cabinet with lock for Engineer

(j) Sink with running water, attached drain board and drain capable of handling separate material

(k) Metal stand for holding washing sieves

(l) Two element hot plate or other comparable heating device, with dial type thermostatic controls for drying aggregates

(m) Mechanical shaker and appropriate sieves (listed in JMF, Table 3) meeting the requirements of ASTM E-11 for determining the gradation of coarse and fine aggregates in accordance with ASTM C 136

(n) Marshall testing equipment meeting ASTM D 6926, ASTM D 6927, or ASTM D 5581 as necessary, automatic compaction equipment capable of compacting three specimens at once and other apparatus as specified in ASTM C 127, D 2172, D 2726, and D 2041

(o) Oven, thermostatically controlled, inside minimum 1 cubic foot

(p) Two volumetric specific gravity flasks, 500 CC

(q) Other necessary hand tools required for sampling and testing

(r) Library containing contract specifications, latest ASTM volumes 4.01, 4.02,4.03 and 4.09, AASHTO standard specification parts I and II, and Asphalt Institute Publication MS-2.

(s) Equipment for Theoretical Specific Gravity testing including a 4,000 cc pycnometer, vacuum pump capable of maintaining 30 ml mercury pressure and a balance, 16-20 kilograms with accuracy of 0.5 grams

(t) Extraction equipment, centrifuge and reflux types and ROTOflex equipment

(u) A masonry saw with diamond blade for trimming pavement cores and samples

(v) Telephone

Approval of the plant and testing laboratory by the Engineer requires all facilities and equipment to be in good working order during production, sampling and testing. Failure to provide the specified facilities shall be sufficient cause for disapproving bituminous plant operations.

The Owner shall have access to the lab and at the plant whenever Contractor is producing asphalt for the project.

(3) Inspection of Plant. The Engineer, or Engineer's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

(4) Storage Bins and Surge Bins. Use of surge bins or storage bins for temporary storage of hot bituminous mixtures will be permitted as follows:

(a) The bituminous mixture may be stored in surge bins for a period of time not to exceed 3 hours.

(b) The bituminous mixture may be stored in insulated storage bins for a period of time not to exceed 24 hours.

The bins shall be such that mix drawn from them meets the same requirements as mix loaded directly into trucks.

If the Engineer determines that there is an excessive amount of heat loss, segregation or oxidation of the

mixture due to temporary storage, no temporary storage will be allowed.

403-4.3 HAULING EQUIPMENT. Trucks used for hauling bituminous mixtures shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of an approved asphalt release agent. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

403-4.4 BITUMINOUS PAVERS. Bituminous pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of bituminous plant mix material that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

The paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet (9.14 m) in length.

b. Taut stringline (wire) set to grade.

c. Short ski or shoe.

d. Laser control.

If, during construction, it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement and/or base course that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and satisfactory equipment shall be provided by the Contractor.

403-4.5 ROLLERS. Rollers of the vibratory, steel wheel, and pneumatic-tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition.

All rollers shall be specifically designed and suitable for compacting hot mix bituminous concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used. Depressions in pavement surfaces caused by rollers shall be repaired

by the Contractor at its own expense.

The use of equipment that causes crushing of the aggregate will not be permitted.

a. Nuclear Densometer. The Contractor shall have on site a nuclear densometer during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the nuclear densometer and obtain accurate density readings for all new bituminous concrete. These densities shall be supplied to the Engineer upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

403-4.6 PREPARATION OF BITUMINOUS MATERIAL. The bituminous material shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of the bituminous material delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325 degrees F (160 degrees C), unless otherwise required by the manufacturer.

403-4.7 PREPARATION OF MINERAL AGGREGATE. The aggregate for the mixture shall be heated and dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350 degrees F (175 degrees C) when the asphalt is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

403-4.8 PREPARATION OF BITUMINOUS MIXTURE. The aggregates and the bituminous material shall be weighed or metered and introduced into the mixer in the amount specified by the job mix formula.

The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95 percent of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all bituminous mixtures upon discharge shall not exceed 0.5 percent.

403-4.9 PREPARATION OF THE UNDERLYING SURFACE. Immediately before placing the bituminous mixture, the underlying course shall be cleaned of all dust and debris. A prime coat or tack coat shall be applied in accordance with Item P-602 or P-603, if shown on the plans.

403-4.10 LAYDOWN PLAN, TRANSPORTING, PLACING, AND FINISHING. Prior to the placement of the bituminous mixture, the Contractor shall prepare a laydown plan for approval by the Engineer. This is to minimize the number of cold joints in the pavement. The laydown plan shall include the sequence of paving laydown by stations, width of lanes, temporary ramp location(s), and laydown temperature. The laydown plan shall also include estimated time of completion for each

portion of the work (i.e. milling, paving, rolling, cooling, etc.). Modifications to the laydown plan shall be approved by the Engineer.

The bituminous mixture shall be transported from the mixing plant to the site in vehicles conforming to the requirements of paragraph 403-4.3. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

The Contractor may elect to use a material transfer vehicle to deliver mix to the paver.

Paving during nighttime construction shall require the following:

a. All paving machines, rollers, distribution trucks and other vehicles required by the Contractor for his operations shall be equipped with artificial illumination sufficient to safely complete the work.

b. Minimum illumination level shall be twenty (20) horizontal foot candles and maintained in the following areas:

(1) An area of 30 feet wide by 30 feet long immediately behind the paving machines during the operations of the machines.

(2) An area 15 feet wide by 30 feet long immediately in front and back of all rolling equipment, during operation of the equipment.

(3) An area 15 feet wide by 15 feet long at any point where an area is being tack coated prior to the placement of pavement.

c. As partial fulfillment of the above requirements, the Contractor shall furnish and use, complete artificial lighting units with a minimum capacity of 3,000 watt electric beam lights, affixed to all equipment in such a way to direct illumination on the area under construction.

The initial placement and compaction of the mixture shall occur at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250°F (121°C).

Edges of existing bituminous pavement abutting the new work shall be saw cut and carefully removed as shown on the drawings and painted with bituminous tack coat before new material is placed against it.

Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 except where edge lanes require less width to complete the area. Additional screed sections shall not be attached to widen paver to meet the minimum lane width requirements specified above unless additional auger sections are added to match. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 foot; however, the joint in the surface top course shall be at the centerline of crowned pavements. Transverse joints in one course shall be offset by at least 10 feet from

transverse joints in the previous course.

Transverse joints in adjacent lanes shall be offset a minimum of 10 feet.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools.

403-4.11 COMPACTION OF MIXTURE. After placing, the mixture shall be thoroughly and uniformly compacted by power rollers. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained.

To prevent adhesion of the mixture to the roller, the wheels shall be equipped with a scraper and kept properly moistened using a water soluble asphalt release agent approved by the engineer.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power driven tampers. Tampers shall weigh not less than 275 pounds, have a tamping plate width not less than 15 inches, be rated at not less than 4,200 vibrations per minute, and be suitably equipped with a standard tamping plate wetting device.

Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

403-4.12 JOINTS. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be given a tack coat of bituminous material before placing any fresh mixture against the joint.

Longitudinal joints which are irregular, damaged, uncompacted, or otherwise defective shall be cut back to expose a clean, sound surface for the full depth of the course. All contact surfaces shall be given a tack coat of bituminous material prior to placing any fresh mixture against the joint. The cost of this work and tack coat shall be considered incidental to the cost of the bituminous course.

MATERIAL ACCEPTANCE

403-5.1 ACCEPTANCE SAMPLING AND TESTING. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor. Testing organizations performing these tests shall meet the requirements of ASTM D 3666. All equipment in Contractor furnished laboratories shall be calibrated by the testing organization prior to the start of operations.

a. Field Placed Material. Material placed in the field shall be tested for mat and joint density on a lot basis. A lot will consist of:

- one day or shift's production not to exceed 2,000 tons, or
- a half day or shift's production where a day's production is expected to consist of between 2,000 and 4,000 tons, or
- similar subdivisions for tonnages over 4,000 tons.

Where more than one plant is simultaneously producing material for the job, the lot sizes shall apply separately for each plant.

(1) Mat Density. The lot shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Cores shall not be taken closer than one foot from a transverse or longitudinal joint.

(2) Joint Density. The lot shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Edge of cores will be taken within 6 inches of the joint of the same lot material but not directly on the joint.

(3) Sampling. Samples shall be neatly cut with a core drill. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with diamond chips embedded in the metal cutting edge. The minimum diameter of the sample shall be five inches. Samples that are clearly defective, as a result of sampling, shall be discarded and another sample taken. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored pavement. Cored holes shall be filled in a manner acceptable to the Engineer and within one day after sampling.

(4) Testing. The bulk specific gravity of each cored sample will be measured by the Engineer in accordance with ASTM D 2726 or ASTM D 1188, whichever is applicable. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the average bulk specific gravity of all laboratory prepared specimens for the lot, as determined as follows:

(a) Sufficient material for preparation of test specimens for all testing will be sampled by the Engineer on a random basis, in accordance with the procedures contained in ASTM D 3665. One set of laboratory compacted specimens will be prepared for each sublot in accordance with ASTM D 6926, at the number of blows required by paragraph 403-3.2, Table 1. Each set of laboratory

compacted specimens will consist of three test portions prepared from the same sample increment. The sample of bituminous mixture may be put in a covered metal tin and placed in an oven for not less than 30 minutes or more than 60 minutes to stabilize to compaction temperature. The compaction temperature of the specimens shall be as specified in the job mix formula.

(b) The bulk specific gravity of each test specimen shall be measured by the Engineer in accordance with ASTM D 2726 using the procedure for laboratory-prepared thoroughly dry specimens, or ASTM D 1188, whichever is applicable, for use in computing pavement density.

(c) The bulk specific gravity used to determine the joint density at joints formed between different lots shall be the lowest of the bulk specific gravity values from the two different lots.

(5) Acceptance. Acceptance of field placed material for mat and joint density will be determined by the Engineer in accordance with the requirements of paragraph 403-5.2b.

d. Partial Lots — Field Placed Material. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or other minor tonnage placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

The last batch produced where production is halted will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. In addition, an agreed to minor placement will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. Where three sublots are produced, they shall constitute a lot. Where one or two sublots are produced, they shall be incorporated into the next lot, and the total number of sublots shall be used in the acceptance plan calculation, i.e., n = 5 or n = 6, for example. Partial lots at the end of asphalt production on the project shall be included with the previous lot.

403-5.2 ACCEPTANCE CRITERIA.

a. General. Acceptance will be based on the following characteristics of the bituminous mixture and completed pavement and test results:

(1) Mat density
(2) Joint density
(3) Thickness
(4) Smoothness
(5) Grade

Mat density will be evaluated for acceptance in accordance with paragraph 403-5.2b(1). Joint density will be evaluated for acceptance in accordance with paragraph 403-5.2b(2).

Thickness will be evaluated by the Engineer for compliance in accordance with paragraph 403-5.2b(3). Acceptance for smoothness will be based on the criteria contained in paragraph 403-5.2b(4). Acceptance for grade will be based on the criteria contained in paragraph 403-5.2b(5).

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of bituminous mixture which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such

rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Acceptance Criteria.

(1) Mat Density. Acceptance of each lot of plant produced material for mat density shall be based on the average of all of the densities taken from the sublots. If the average mat density of the lot so established equals or exceeds 96 percent, the lot shall be acceptable. If the average mat density of the lot is below 96 percent, the lot shall be removed and replaced at the Contractor's expense.

(2) Joint Density. Acceptance of each lot of plant produced material for joint density shall be based on the average of all of the joint densities taken from the sublots. If the average joint density of the lot so established equals or exceeds 94 percent, the lot shall be acceptable. If the average joint density of the lot is less than 94 percent, the Contractor shall stop production and evaluate the method of compacting joints. Production may resume once the reason for poor compaction has been determined and appropriate measures have been taken to ensure proper compaction.

(3) Thickness. Thickness of each course shall be evaluated by the Engineer for compliance to the requirements shown on the plans. Measurements of thickness shall be made by the Engineer using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point shall not be more than ¼ inch less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, shall not be less than the indicated thickness. Where thickness deficiency exceeds the specified tolerances, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the Engineer to circumscribe the deficient area.

(4) Smoothness. The final surface shall be free from roller marks. The finished surfaces of each course of the pavement, except the finished surface of the final surface course, shall not vary more than ⅜ inch when evaluated with a 16 foot straightedge. The finished surface of the final surface course shall not vary more than ¼ inch when evaluated with a 16 foot straightedge. The lot size shall be 2,000 square yards. Smoothness measurements shall be made at 50 foot intervals and as determined by the Engineer. In the longitudinal direction, a smoothness reading shall be made at the center of each paving lane. In the transverse direction, smoothness readings shall be made continuously across the full width of the pavement. However, transverse smoothness readings shall not be made across designed grade changes. At warped transition areas, straightedge position shall be adjusted to measure surface smoothness and not design grade transitions. When more than 15 percent of all measurements within a lot exceed the specified tolerance, the Contractor shall remove the deficient area to the depth of the course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. High point grinding will be limited to 15 square yards. Areas in excess of 15 square yards will require removal and replacement of the course in accordance with the limitations noted above.

(5) Grade. The finished surface of the pavement shall not vary from the gradeline elevations and cross sections shown on the plans by more than ½ inch (12.70 mm). The finished grade of each lot will be determined by running levels at intervals of 50 feet (15.2 m) or less longitudinally and all breaks in grade transversely (not to exceed 50 feet) to determine the elevation of the completed pavement. The Contractor shall pay the cost of surveying of the level runs that shall be performed by a

licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer. The lot size shall be 2,000 square yards. When more than 15 percent of all the measurements within a lot are outside the specified tolerance, or if any one shot within the lot deviates ¾ inch or more from planned grade, the Contractor shall remove the deficient area to the depth of the final course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. High point grinding will be limited to 15 square yards. Areas in excess of 15 square yards will require removal and replacement of the pavement in accordance with the limitations noted above.

403-5.3 RESAMPLING PAVEMENT FOR MAT DENSITY.

a. General. Resampling of a lot of pavement will only be allowed for mat density and then, only if the Contractor requests same in writing, within 48 hours after receiving the written test results from the Engineer. A retest will consist of all the sampling and testing procedures contained in paragraphs 403-5.1b(1). Only one resampling per lot will be permitted.

(1) A redefined mat density shall be calculated for the resampled lot. The number of tests used to calculate the redefined mat density shall include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for Resampled Lots. The redefined mat density for a resampled lot shall be used to evaluate the acceptance of that lot in accordance with Paragraph 403-5.2.

c. Outliers. If the tests within a lot include a very large or a very small value that appears to be outside the normal limits of variation, check for an outlier in accordance with ASTM E 178, at a significance level of 5 percent, to determine if this value should be discarded.

CONTRACTOR QUALITY CONTROL

403-6.1 GENERAL. The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by paragraph 403-6.3, including but not limited to:

a. Mix Design
b. Aggregate Grading
c. Quality of Materials
d. Stockpile Management
e. Proportioning
f. Mixing and Transportation
g. Placing and Finishing
h. Joints
i. Compaction
j. Surface smoothness

403-6.2 TESTING LABORATORY. The Contractor shall provide a fully equipped asphalt laboratory meeting the requirements of paragraph 403-3.5 and 403-4.2a(2) located at the plant or job site. The

Contractor shall provide the Engineer with certification stating that all of the testing equipment to be used is properly calibrated and will meet the specifications applicable for the specified test procedures.

403-6.3 QUALITY CONTROL TESTING. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness.

a. Asphalt Content. A minimum of two extraction tests shall be performed per lot in accordance with ASTM D 2172 for determination of asphalt content. The weight of ash portion of the extraction test, as described in ASTM D 2172, shall be determined as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture. The asphalt content for the lot will be determined by averaging the test results.

The use of the nuclear method for determining asphalt content in accordance with ASTM D 4125 is permitted, provided that it is calibrated for the specific mix being used.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D 5444 and ASTM C 136 (Dry Sieve). When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch plants, or from the cold feed on drum mix or continuous mix plants, and tested in accordance with ASTM C 136 (dry sieve) using actual batch weights to determine the combined aggregate gradation of the mixture.

c. Moisture Content of Aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

d. Moisture Content of Mixture. The moisture content of the mixture shall be determined once per lot in accordance with ASTM D 1461.

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the bitumen in the storage tank, the mixture at the plant, and the mixture at the job site.

f. In-Place Density Monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D 2950.

g. Additional Testing. Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor's option.

h. Monitoring. The Engineer reserves the right to monitor any or all of the above testing.

403-6.4 SAMPLING. When directed by the Engineer, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in

accordance with standard procedures specified.

403-6.5 CONTROL CHARTS. The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation and asphalt content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

a. Individual Measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation and asphalt content. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS		
Sieve	Action Limit	Suspension Limit
¾ inch	0%	0%
½ inch	+/-6%	+/-9%
⅜ inch	+/-6%	+/-9%
No. 4	+/-6%	+/-9%
No. 16	+/-5%	+/-7.5%
No. 50	+/-3%	+/-4.5%
No. 200	+/-2%	+/-3%
Asphalt Content	+/-0.45%	+/-0.70%

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

CONTROL CHART LIMITS BASED ON RANGE (Based on n = 2)	
Sieve	Suspension Limit
½ inch	11 percent
⅜ inch	11 percent
No. 4	11 percent
No. 16	9 percent

No. 50	6 percent
No. 200	3.5 percent
Asphalt Content	0.8 percent

c. Corrective Action. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or

(2) Two points in a row fall outside the Action Limit line for individual measurements.

403-6.6 QUALITY CONTROL REPORTS. The Contractor shall maintain records and shall submit reports of quality control activities daily.

METHOD OF MEASUREMENT

403-7.1 MEASUREMENT. Plant mix bituminous concrete pavement shall be measured by the number of square yards of bituminous mixture used in the accepted work.

BASIS OF PAYMENT

403-8.1 PAYMENT. Payment for an accepted lot of bituminous concrete pavement shall be made at the contract unit price per square yard for bituminous mixture. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

4" Asphaltic Concrete Pavement (P-403) - per square yard

1.5" Asphaltic Concrete Pavement (P-403) - per square yard

TESTING REQUIREMENTS

ASTM C 29	Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75μm (No.200) Sieve in Mineral Aggregates by Washing
ASTM C 127	Specific Gravity and Absorption of Coarse Aggregate
ASTM C 131	Resistance to Degradation of Small Size Coarse Aggregate by Abrasion

	and Impact in the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 183	Sampling and the Amount of Testing of Hydraulic Cement
ASTM C 566	Total Evaporable Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 979	Sampling Bituminous Paving Mixtures
ASTM D 995	Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving Mixtures
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures
ASTM D 1074	Compressive Strength of Bituminous Mixtures
ASTM D 1188	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1461	Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3665	Random Sampling of Construction Materials
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 4125	Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 4791	Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867	Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	Mechanical Size Analysis of Extracted Aggregate
ASTM D 5581	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6" Diameter Specimen)
ASTM D 6926	Preparation of Bituminous Specimens Using MARSHALL Apparatus
ASTM D 6927	MARSHALL Stability and Flow of Bituminous Mixtures
ASTM E 11	Wire-Cloth Sieves for Testing Purposes
ASTM E 178	Dealing with Outlying Observations
AASHTO T 30	Mechanical Analysis of Extracted Aggregate
The Asphalt Institute's Manual No. 2 (MS-2)	Mix Design Methods for Asphalt Concrete

MATERIAL REQUIREMENTS

ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 946	Penetration Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4552	Classifying Hot-Mix Recycling Agents
AASHTO MP1	Performance Graded Binder Designation

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SECTION P-603 BITUMINOUS TACK COAT

DESCRIPTION

603-1.1 This item shall consist of preparing and treating a bituminous or concrete surface with bituminous material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

603-2.1 BITUMINOUS MATERIALS. The bituminous material shall be either cutback asphalt, emulsified asphalt, or tar and shall conform to the requirements of Table 1. The type, grade, controlling specification, and application temperature of bituminous material to be used shall be specified by the Engineer.

TABLE 1. BITUMINOUS MATERIAL

Type and Grade	Specification	Application Temperature Deg. F	Deg. C
Emulsified Asphalt			
SS-1, SS-1h	ASTM D 977	75-130	25-55
CSS-1, CSS-1h	ASTM D 2397	75-130	25-55
Cutback Asphalt			
RC-70	ASTM D 2028	120-160	50-70
Tar			
RTCB 5, RTCB 6	AASHTO M 52	60-120	15-50

CONSTRUCTION METHODS

603-3.1 WEATHER LIMITATIONS. The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is above 60°F (15°C). The temperature requirements may be waived, but only when so directed by the Engineer.

603-3.2 EQUIPMENT. The Contractor shall provide equipment for heating and applying the bituminous material.

The distributor shall be designed, equipped, maintained, and operated so that bituminous material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10 percent. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

If the distributor is not equipped with an operable quick shut off valve, the tack operations shall be started and stopped on building paper. The Contractor shall remove blotting sand prior to asphalt

concrete lay down operations at no additional expense to the owner.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

603-3.3 APPLICATION OF BITUMINOUS MATERIAL. Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or airblast to remove all loose dirt and other objectionable material.

Emulsified asphalt shall be diluted by the addition of water when directed by the Engineer and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlying mixture is placed on the tacked surface.

The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of 0.05 to 0.15 gallons per square yard (0.24 to 0.72 liters per square meter) depending on the condition of the existing surface. The type of bituminous material and application rate shall be approved by the Engineer prior to application.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

603-3.4 BITUMINOUS MATERIAL CONTRACTOR'S RESPONSIBILITY. Samples of the bituminous material that the Contractor proposes to use, together with a statement as to its source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the bituminous material to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials so demonstrated by service tests, shall be acceptable.

The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The tests reports shall contain all the data required by the applicable specification. If the Contractor applies the material prior to receipt of the tests reports, payment for the material shall be withheld until they are received. If the material does not pass the specifications it shall be replaced at the contractor's expense. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing samples of material received for use on the project.

603-3.5 FREIGHT AND WEIGH BILLS. Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the bituminous materials actually used in the construction covered by the contract. The Contractor shall not remove bituminous material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

METHOD OF MEASUREMENT

603-4.1 The bituminous material for tack coat shall be measured by the square yard.

BASIS OF PAYMENT

603.5-1 Payment shall be made at the contract unit price per square yard of bituminous material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Bituminous Tack Coat (P-603) - per square yard

MATERIAL REQUIREMENTS

ASTM D 633	Volume Correction Table for Road Tar
ASTM D 977	Emulsified Asphalt
ASTM D 1250	Petroleum Measurement Tables
ASTM D 2028	Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	Cationic Emulsified Asphalt
Asphalt Institute Manual MS-6 Table IV-3	Asphalt Pocketbook of Useful Information (Temperature-Volume Corrections for Emulsified Asphalts)

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SECTION P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

DESCRIPTION

610-1.1 This item shall consist of plain structural portland cement concrete, prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

MATERIALS

610-2.1 GENERAL. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

Aggregates shall be tested for deleterious reactivity with alkalies in the cement that may cause excessive expansion of the concrete. Acceptance of aggregates shall be based upon satisfactory evidence furnished by the Contractor that the aggregates, combined with other mixture constituents, do not produce excessive expansion in the concrete. This evidence shall include service records of concrete of comparable properties under similar conditions or exposure and certified records of tests by a testing laboratory that meets the requirements of ASTM C 1077. Tests shall be made in accordance with ASTM C 1260. Test specimens shall be produced using all components (e.g. coarse aggregate, fine aggregate, cement and fly ash...) to be included in the produced concrete. If the mean expansion of the test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 16 days from casting the aggregates shall be accepted. If the mean expansion at 16 days is greater than 0.10% but less than 0.15%, the aggregate may be accepted based upon satisfactory service records and acceptance of the aggregate by a State Highway Department specifically addressing Alkali-Silica Reactivity. If the expansion is greater than 0.15%, the aggregate shall not be accepted for use.

610-2.2 COARSE AGGREGATE. The coarse aggregate for concrete shall meet the requirements of ASTM C 33. Crushed stone aggregate shall have a durability factor, as determined by ASTM C 666, greater than or equal to 95. The Engineer may consider and reserve final approval of other State classification procedures addressing aggregate durability.

Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

610-2.3 FINE AGGREGATE. The fine aggregate for concrete shall meet the requirements of ASTM C 33.

The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2 when tested in accordance with ASTM C 136:

TABLE 1. GRADATION FOR COARSE AGGREGATE

Sieve Designation (square openings)	Percentage by Weight Passing Sieves						
	2"	1-1/2"	1"	3/4"	1/2"	3/8"	No.4
No. 4 to 3/4 in. (4.75-19.0 mm)			100	90-100		20-55	0-10
No. 4 to 1 in. (4.75-25.0 mm)		100	90-100		25-60		0-10
No. 4 to 1-1/2 in. (4.75-38.1 mm)	100	95-100		35-70		10-30	0-5

TABLE 2. GRADATION FOR FINE AGGREGATE

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3/8 inch (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 16 (1.18 mm)	45-80
No. 30 (0.60 mm)	25-55
No. 50 (0.30 mm)	10-30
No. 100 (0.15 mm)	2-10

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 CEMENT. Cement shall conform to the requirements of ASTM C 150 Type II.

The Contractor shall furnish vendors' certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 WATER. The water used in concrete shall be free from sewage, oil, acid, strong alkalies, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

610-2.6 ADMIXTURES. The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolons meeting the requirements of ASTM C 618.

Air-entraining admixtures shall meet the requirements of ASTM C 260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.

610-2.7 PREMOLDED JOINT MATERIAL. Premolded joint material for expansion joints shall meet the requirements of ASTM D 1751 or ASTM D 1752.

610-2.8 DELETED.

610-2.9 DELETED.

610-2.10 COVER MATERIALS FOR CURING. Curing materials shall conform to one of the following specifications:

Waterproof paper for curing concrete	ASTM C 171
Polyethylene Sheeting for Curing Concrete	ASTM C 171
Liquid Membrane-Forming Compounds for Curing Concrete	ASTM C 309, Type 2

CONSTRUCTION METHODS

610-3.1 GENERAL. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified herein. All machinery and equipment owned or controlled by the Contractor, which he proposes to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610-3.2 CONCRETE COMPOSITION. The concrete shall develop a compressive strength of 3,000 psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The concrete shall contain not less than 470 pounds of cement per cubic yard (280 kg per cubic meter). The concrete shall contain 5 percent of entrained air, plus or minus 1 percent, as determined by ASTM C 231 and shall have a slump of not more than 4 inches (10 cm) as determined by ASTM C 143.

610-3.3 ACCEPTANCE SAMPLING AND TESTING. Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Compressive strength specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The Contractor shall cure and store the test specimens under such conditions as directed. The Engineer will make the actual tests on the specimens at no expense to the Contractor.

610-3.4 PROPORTIONING AND MEASURING DEVICES. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610-3.5 CONSISTENCY. The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

610-3.6 MIXING. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94.

610-3.7 MIXING CONDITIONS. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F (4°C) without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F (10°C) nor more than 100°F (38°C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his/her expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610-3.8 FORMS. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces,

walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.

610-3.9 PLACING REINFORCEMENT. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.10 EMBEDDED ITEMS. Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610-3.11 PLACING CONCRETE. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 feet (1.5 m), or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610-3.12 CONSTRUCTION JOINTS. When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete that has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610-3.13 EXPANSION JOINTS. Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610-3.14 DEFECTIVE WORK. Any defective work discovered after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the

concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610-3.15 SURFACE FINISH. All exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610-3.16 CURING AND PROTECTION. All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610-3.17 DRAINS OR DUCTS. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.18 COLD WEATHER PROTECTION. When concrete is placed at temperatures below 40°F (4°C), the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50°F and 100°F (10°C and 38°C).

Calcium chloride may be incorporated in the mixing water when directed by the Engineer. Not more than 2 pounds (908 grams) of Type 1 nor more than 1.6 pounds (726 grams) of Type 2 shall be added per bag of cement. After the concrete has been placed, the Contractor shall provide sufficient protection such as cover, canvas, framework, heating apparatus, etc., to enclose and protect the structure and maintain the temperature of the mix at not less than 50°F (10°C) until at least 60% of the designed strength has been attained.

610-3.19 FILLING JOINTS. All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

METHOD OF MEASUREMENT

610-4.1 No measurement of structural Portland Cement Concrete shall be made.

BASIS OF PAYMENT

610-5.1 The performance of this work and the supplying of these materials as indicated on the plans shall be considered as a subsidiary obligation of the Contractor covered under other contract items. The inclusion of this item in these specifications is merely to establish a standard of performance and shall not be construed as creating a separate pay item.

TESTING REQUIREMENTS

ASTM C 31	Making and Curing Test Specimens in the Field
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 138	Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143	Slump of Hydraulic Cement Concrete
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 666	Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 1077	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1260	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

MATERIAL REQUIREMENTS

ASTM A 184	Specification for Fabricated Deformed Steel Bar or Rod Mats for Concrete Reinforcement
ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 704	Welded Steel Plain Bars or Rod Mats for Concrete Reinforcement
ASTM C 33	Concrete Aggregates
ASTM C 94	Ready-Mixed Concrete

ASTM C 150	Portland Cement
ASTM C 171	Sheet Materials for Curing Concrete
ASTM C 172	Sampling Freshly Mixed Concrete
ASTM C 260	Air-Entraining Admixtures for Concrete
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Chemical Admixtures for Concrete
ASTM C 595	Blended Hydraulic Cements
ASTM C 618	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO T 26	Quality of Water to be Used in Concrete

SECTION P-620 RUNWAY, TAXIWAY AND APRON PAINTING (MOD)

DESCRIPTION

620-1.1 This item shall consist of the obliteration of existing pavement markings, and the painting of markings and stripes on the surface of taxiways and aprons in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

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.

620-2.2 PAINT. Paint shall be waterborne in accordance with the requirements of paragraph 620-2.2a. Paint shall be furnished in white-37925 and yellow-33538 in accordance with Federal Standard No 595.

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

620-2.3 REFLECTIVE MEDIA. Glass beads shall meet the requirements of Fed. Spec. TT-B-1325, III. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by the manufacturer of the paint.

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 degrees F (7 degrees C) and rising and the pavement surface temperature is at least 5 degrees F (2.7 degrees C) above the dew point.

620-3.2 EQUIPMENT. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead and/or silica sand 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 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 sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials.

620-3.4 OBLITERATE EXISTING PAVEMENT MARKINGS. This item shall consist of obliterating existing pavement markings in accordance with Section 701-3.06 of ADOT Standard Specifications for Road and Bridge Construction.

620-3.5 LAYOUT OF MARKINGS. The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans. Stencils shall be manufactured and utilized for surface painted location signs. All stencils shall be metal and be turned over to the City in new condition at the end of the project.

620-3.6 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. All colors of location sign shall be painted in each location prior to moving to the next location. Signs must be completed per location.

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 spacing shall be within the following tolerances:

Dimension and Spacing	Tolerance
36 inches (910 mm) or less	+/- 1/2 inch (12 mm)
Greater than 36 inches 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 inches (51 mm)
Greater than 60 feet (18.3 m)	+/- 3 inches (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(s) shown in Table 1. The addition of thinner will not be permitted. A minimum period of 48 hours shall elapse between placement of a seal coat and application of the paint.

TABLE 1. APPLICATION RATES FOR PAINT AND GLASS BEADS

Paint Type	**Paint Square feet per Gallon, ft^2/gal**	**Glass Beads, Type III Pounds per gallon of paint--lb./gal.**
Waterborne	115 ft^2/gal. Maximum	10 lb./gal. Minimum

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 which 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 Table 1. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made.

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 PROTECTION. After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings of paint.

METHOD OF MEASUREMENT

620-4.1 The quantity for obliteration of existing pavement markings to be paid for shall be the number of square feet of pavement markings removed in accordance with the specifications and accepted by the Engineer.

620-4.2 The quantity of surface painted location signs to be paid for shall be made per each sign painted in accordance with the specifications and accepted by the Engineer. No separate measurement or payment shall be made for glass beads or paint.

620-4.3 The quantity of taxiway centerline markings to be paid for shall be the number of square feet of yellow reflectorized painting performed in accordance with the specifications and accepted by the Engineer. No separate measurement or payment shall be made for black paint or glass beads.

BASIS OF PAYMENT

620-5.1 Payment shall be made at the respective contract price per square foot for obliteration of existing pavement markings. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

620-5.2 Payment shall be made per each surface painted location sign. This price shall be full compensation for furnishing all materials (including glass beads and paint) and for all labor, equipment, tools, and incidentals necessary to complete the item.

620-5.3 Payment shall be made at the respective contract price per square foot of yellow reflectorized paint striping. This price shall be full compensation for furnishing all materials (including glass beads) and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Obliterate Existing Pavement Markings (P-620-5.1)	-- per square foot
Surface Painted Location Signs (P-620-5.2)	-- per each
Yellow Reflectorized Paintstriping (P-620-5.3)	-- per square foot
White Reflectorized Paintstriping (P-620-5.4)	-- per square foot

TESTING REQUIREMENTS

ASTM C-146	Chemical Analysis of Glass Sand
ASTM C 371	Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D 92	Test Method for Flash and Fire Points by Cleveland Open Cup
ASTM D 711	No-Pick-Up Time of Traffic Paint
ASTM D 968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 2240	Test Method for Rubber Products-Durometer Hardness
ASTM G 53	Operating Light and Water-Exposure Apparatus (Florescent UV-Condensation Type) for Exposure of Nonmetallic Materials.

MATERIAL REQUIREMENTS

ASTM D 476	Specifications for Titanium Dioxide Pigments
Code of Federal Regulations	40 CFR Part 60, Appendix A 29 CFR Part 1910.1200
Fed. Spec. TT-B-1325	Beads (Glass Spheres) Retroreflective
Fed. Spec. TT-P-1952D	Paint, Traffic and Airfield Marking, Waterborne
Commercial Item Description (CID) A-A-2886A	Paint, Traffic, Solvent Based
Federal Standard 595	Colors used in Government Procurement

PROPOSAL

Place Glendale Airport City/Glendale

Date 7/3/2012

Proposal of RK Sanders Inc a Corporation organized and existing under the laws of the State of Arizona, a ~~partnership consi~~sting of _____; or an ~~individual~~ trading as _____.

TO THE HONORABLE MAYOR AND COUNCIL
CITY OF GLENDALE
GLENDALE, ARIZONA

Gentlemen:

The undersigned hereby proposes and agrees to furnish any and all required labor, materials, construction equipment, transportation and services for the construction of: **PROJECT 0910005-RUNWAY SAFETY IMPROVEMENTS**, in strict conformity with the plans and specifications for the following unit prices:

(Extension of these unit prices on the basis of estimated quantities and the totaling of these extensions are for the purpose of comparing bids only. The mathematics of such extensions and totaling will be checked and corrected by the Public Works/Engineering Department, before evaluating the bids, and the lowest of such corrected and checked totals will determine the lowest bids.)

BID SCHEDULE

PROJECT NUMBER: 0910005

PROJECT NAME: Runway Safety Improvements

Item No.	Description	Quantity	Unit	Unit Cost	Total Cost
1	Mobilization (SP-19)	1	LS	20,000.00	20,000.00
2	Traffic Control & Barricading (SP-27)	1	LS	6,000.00	6000.00
3	Stormwater Pollution Prevention (SP-22)	1	LS	5500.00	5500.00
4	Construction Surveying and Layout (SP-3)	1	LS	6700.75	6700.75
5	Miscellaneous Removals and Other Work (SP-34)	1	LS	1639.00	1639.00
6	Clearing and Grubbing (P-151)	6.5	AC	368.00	2392.00
7	Soil Sterilant (SS-13)	9,760	SY	.20	1952.00
8	Subgrade Preparation (SP-38)	31,890	SY	2.20	70,158.00
9	6" Crushed Aggregate Base Course (Item P-209)	4,510	SY	10.00	45,100.00
10	Bituminous Prime Coat (SP-25)	8,630	SY	3.00	25,890.00
11	Bituminous Tack Coat (P-603)	4,400	SY	1.30	5720.00
12	1.5" Asphaltic Concrete Pavement (P-403)	4,230	SY	9.50	40,185.00
13	4" Asphaltic Concrete (P-403)	4,400	SY	20.00	88,000.00
14	Sawcut & Remove Existing AC Pavement (SP-26)	105	SY	3.50	367.50
15	Pavement Marking (Yellow Reflectorized) (P-620-5.3)	4,520	SF	3.00	13,560.00
16	Disassemble, Salvage, and Relocate Existing Blast Deflectors on New Anchorage (SS-12)	1	LS	17,830.00	17,830.00
17	Remove and Replace Existing Fence (SP-35)	1	LS	4000.00	4000.00
18	Remove and Relocate Existing 30' Double Swing Gate (SP-36)	1	LS	3700.25	3700.25
19	Adjust Lights to Finished Grade (SP-37)	19	EA	775.50	14,734.50
20	Adjust Pull Box to Finished Grade (SP-43)	1	EA	700.50	700.50
21	Surface Painted Location Signs (P-620-5 2)	5	EA	384.00	1920.00
22	Obliterate Existing Pavement Markings (P-620-5 1)	20	SF	98.00	1960.00

23	Relocate Existing Windcone (Item L-107)	1	LS	5769.00	5769.00
24	Install Owner Provided Wind Sensor System (SP-39)	2	EA	5600.00	11,200.00
25	Survey Markers (SP-40)	2	EA	375.00	750.00
26	Utility Relocation (Contingent Item) (SGC-33)	1	LS	$10,0000.00	$10,000 00
27	Pavement Marking (White Reflectorized) (P-620-5.4)	350	SF	2.50	875.00

GRAND TOTAL 406,604.00

The undersigned hereby declares that he has visited the site(s) and has carefully examined the contract documents relating to the work covered by the above bid or bids.

Upon receipt of notice of the acceptance of this bid, we will execute the formal contract attached within ten (10) days, and will deliver a one hundred percent (100%) Performance Bond for the faithful performance of this Contract, together with a one hundred percent (100%) Payment Bond and Certificate of Insurance.

The bid security attached, with endorsement, in the sum of ten percent (10%) of the total bid, is to become the property of the City of Glendale, Arizona, in the event the Contract and Bonds are not executed within the time set forth, as liquidated damages for the delay and additional work caused thereby.

The undersigned has checked carefully all the above figures and understands that the City of Glendale, Arizona, will not be responsible for any errors or omissions on the part of the undersigned in making up this bid.

The undersigned understands that the Mayor and Council of the City of Glendale, Arizona, reserves the right to reject any or all bids or to waive any informalities or irregularities in the bid.

Arizona Contractor's Classification and License No.

[redacted]

Respectfully submitted,

TCK SANDERS Inc

Contractor

By

P.O. Box 6686

Phx Az 85005

(Complete business address)

Telephone Number: [redacted]

Fax Number:

Bidder shall signify receipt of all Addenda here (if any):

ADDEN. #1 6/29/12

Failure to acknowledge receipt of all Addenda shall render the bid proposal non-responsive and will be rejected.

Acknowledged by

CITY OF GLENDALE

Subcontractor Listing and Certification of Contract Compliance

PROJECT 0910005 - RUNWAY SAFETY IMPROVEMENTS

The undersigned contractor hereby submits the following list of firms to be employed as subcontractors on the above referenced project.

SUBCONTRACTOR	WORK ELEMENTS	CONTRACT VALUE	DBE(Y/N)*	AGENCY**
QT. Testing	QC Testing	5,000 .01%	yes –	ADOT
Utility Constructing	Elec –	.08	yes	ADOT.
Valco Surveying	Survey	01	yes	ADOT

The undersigned hereby certifies that all subcontracts shall be in writing and shall provide that all work to be performed shall be in accordance with the terms of the Contract. All subcontracts shall be subject to approval by the City. Certified copies of all subcontracts shall be furnished to the Engineer; however, prices may be omitted. Subcontracts shall conform to the regulations governing employment of labor.

RK Sanders –
Name of Firm

DBE?(Y/N)* _____ Agency**: ADOT

Signature

Project Manager – Mesa.
Title

*Firms certified as Disadvantaged Business Enterprises. **Indicate certifying agency, e.g., ADOT, MCHD, COP, etc. **This information is requested for tracking purposes only.** The City of Glendale is an equal opportunity employer and minority business enterprises and women's business enterprises are encouraged to submit bids.

Attachment 3 - Bidder's List Form

GLENDALE

BIDDER'S LIST

(Use additional sheets if necessary)

Form BL
(Rev 04/12)

Project Name:

BIDDER/OFFEROR

NAME, ADDRESS, CITY/STATE/ZIP	CONTACT/PHONE	DBE/SBE Y/N	FIRM AGE	GROSS RECEIPTS
RK Sanders Inc PO. Box 6686 Px Az 85005	602 2390808	N	34	___Under $500,000 ___$500,000-$1 million X $1-2 million ___$2-5 million ___$5-10 million ___$10-$15m ___Over $15 million

SUBCONTRACTORS

NAME, ADDRESS, CITY/STATE/ZIP	CONTACT/PHONE	DBE/SBE Y/N	FIRM AGE	GROSS RECEIPTS
QT. Quality Testing 125 S. Hamilton Gilbert Az 85233	480-496 2000	Y		X Under $500,000 ___$500,000-$1 million ___$1-2 million ___$2-5 million ___$5-10 million ___$10-$15m ___Over $15 million
Utility Construction PO. Box 1774	480-654-300	Y		___Under $500,000 ___$500,000-$1 million ___$1-2 million ___$2-5 million ___$5-10 million ___$10-$15m ___Over $15 million
Valco. Surveying	480-990 2412	Y		___Under $500,000 ___$500,000-$1 million ___$1-2 million ___$2-5 million ___$5-10 million ___$10-$15m ___Over $15 million
				___Under $500,000 ___$500,000-$1 million ___$1-2 million ___$2-5 million ___$5-10 million ___$10-$15m ___Over $15 million
				___Under $500,000 ___$500,000-$1 million ___$1-2 million ___$2-5 million ___$5-10 million ___$10-$15m ___Over $15 million

CERTIFICATION OF NONSEGREGATED FACILITIES (CONTRACTORS/SUBCONTRACTORS)

(A certification of Nonsegregated Facilities must be submitted prior to the award of a contract or subcontract (*) exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause).

The federally assisted construction contractor certifies that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that 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 further that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and that 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, rest 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 directive or are in fact segregated on the basis of race, color, religion, sex or national origin, because of habit, local custom, or any other reason. The federally assisted construction contractor agrees that (except where he has obtained identical certifications from proposed subcontractors for specific time periods) 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 he will retain such certifications in his files.

Certification - The information above is true and complete to the best of my knowledge and belief.

Gary Shurtz Project Manager

Name and Title of Signed (Please Type)

Signature

Date 7/2/2012

NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

*Shall be submitted with the Bidder's Bid.

BIDDER'S STATEMENT OF PREVIOUS CONTRACTS SUBJECT TO EEO CLAUSE

The Bidder shall complete the following statement by checking the appropriate boxes.

The Bidder has X has not ____ participated in a previous contract subject to the Equal Opportunity Clause prescribed by Executive Order 11246, as amended, of September 24, 1965.

The Bidder has X has not ____ submitted all compliance reports in connection with any such contract due under the applicable filing requirements; and that representations indicating submission of required compliance reports signed by proposed subcontractors will be obtained prior to award of subcontracts.

If the Bidder has participated in a previous contract subject to the Equal Opportunity Clause and has not submitted compliance reports due under applicable filing requirements, the Bidder shall submit a compliance report on Standard Form 100, "Employee Information Report EEO-1", prior to award of the contract (*).

*Shall be submitted with the Bidder's Bid.

ASSURANCE OF DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

To meet the mandated requirements of the United States Department of Transportation, 49 CFR Part 26, the assurance below shall be signed by the bidder and submitted with the Bidder's Bid.

NOTE: The bidder's execution of the signature portion of this proposal shall also constitute execution of this assurance.

BIDDER'S ASSURANCE OF COMPLIANCE WITH TITLE 49 CFR PART 26 RELATING TO DISADVANTAGED BUSINESS ENTERPRISE PARTICIPATION

The bidder hereby gives assurance pursuant to the requirements of Title 49 CFR Part 26 that bidder has made a reasonable effort to meet the goals for Disadvantaged Business Enterprise participation specified for the contract for which this proposal is submitted, and that bidder, if the contract is awarded to bidder, will have a DBE participation of 10 percent of the amount of this bid. Bidder further gives assurance that bidder will submit the documentation required by said Regulations and the Contract Specifications, including the Listing of Disadvantaged Business Enterprises with which the bidder will subcontract if the contract is awarded and if the bidder is unable to meet the contract goals for DBE participation, of the steps bidder has taken to obtain DBE participation.

Dated 7/3/2012

RK Sanders Inc

Contractor

NOTE: Bidder shall insert in the blanks above the percentage for participation that the Bidder intends to utilize for this project even if the percentage is less than the contract goal. If the Bidder proposes to meet the DBE project goal of 10 percent (as stated in Section 3, Section F, Paragraph 4), the Bidder shall insert that percentage in the Blank above.

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY, AND VOLUNTARY EXCLUSION:

The bidder certifies, by submission of this proposal or acceptance of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

RK Sanders Inc

Contractor

7/2/2012

Date

BUY AMERICAN CERTIFICATE
STEEL AND MANUFACTURED PRODUCTS FOR CONSTRUCTION CONTRACTS

The Contractor agrees that only domestic steel and manufactured products will be used by the Contractor, subcontractors, materialmen and suppliers in the performance of this contract, and defined below:

The following terms apply to this clause:

1. Steel and Manufactured Products. As used in this clause, steel and manufactured products include (1) those produced in the United States or (2) a manufactured product produced in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds sixty (60) percent of the cost of all its components and final assembly has taken place in the United States.

2. Components. As used in this clause, a component means those articles, materials, and supplies incorporated directly into steel and manufactured products.

3. Cost of Components. This means the costs for production of the components, exclusive of final assembly labor costs.

Signature

RK Sanders Inc
(Name of Bidder)

7/2/2012
Date

Project Manager - Member
(Name of Title of Signing Officer)

Business Address

P.O. Box 6686
Phoenix Az
85005

CERTIFICATE OF INSURABILITY

I hereby certify that as a Bidder for the Glendale Municipal Airport RUNWAY SAFETY IMPROVEMENTS PROJECT, I am fully aware of the Insurance Requirements for the Contractor and that by submitting this bid proposed, assure the Owner that I am able to produce the required minimum insurance coverage should I be selected to the successful bidder.

Should I be selected to the successful bidder and then become unable to produce the insurance coverage prior to the award of the project, I understand that my bid will be rejected and that I will forfeit my bid bond.

R.W. Sanders

Signature

7/2/2012

Date

CERTIFICATION REGARDING FOREIGN COUNTRIES

CLAUSE TO BE INCLUDED IN ALL SOLICITATIONS, CONTRACTS, AND SUBCONTRACTS RESULTING FROM PROJECTS FUNDED UNDER AIP

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 or nationals 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 contractor 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 the 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 upon 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 immediate 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 subcontractor for default at no cost to the Government.

Nothing contained in the foregoing shall be constructed 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.

RL Sanders Inc — 7/2/2012

Contractor — Date

CITY OF GLENDALE, ARIZONA
AUTHORIZED SIGNATURE FORM

PROJECT: GLENDALE MUNICIPAL AIRPORT
RUNWAY SAFETY IMPROVEMENTS PROJECT
AIP PROJECT NO. 3-04-0064-20
ADOT No. E1F27
PROJECT #0910005

Whereas, RK Sanders Inc, a Arizona (Name of State) Corporation, is required to execute certain documents which are necessary for the prompt and efficient execution of the corporate business;

NOW, THEREFORE, BE IT RESOLVED, by the Board of Directors of RK Sanders Inc, (Corporate Name), that (name of parties authorized) _____, is/are authorized to execute and sign on behalf of said corporate the following:

1. Contract
2. Bond
3. Payrolls
4. Claims
5. Change Orders
6. All other papers necessary for the corporation's affairs and the execution of the Contract.

The powers and duties herein granted shall be and are hereby granted for the duration of the contract for this project or until express notice of revocation has been duly given in writing, whichever is the lesser period.

Dated and passed by the Board of Directors this 29 day of June, 2012

	Pres.	6272012
(Signature of Persons Authorized to Sign)	(Title)	(Document No.)

CERTIFICATE

STATE OF Arizona)
) ss
COUNTY OF Maricopa)

I, Gary Shurtz of RL Sanders Inc, a corporation, do hereby certify that the above is a true and correct copy of a resolution adopted by the Board of Directors of said corporation, at a meeting of said board held on June 27, 2012 and that the same is in full force and effect at this time. Dated 7/2/2012, 2012

(Officer of Corporation)

(Seal of Corporation)

STATE OF AZIZONA)
) ss
COUNTY OF MARICOPA)

This instrument was acknowledged before me on the 2ND day of July, 2012 by GARY SHURTZ appearing before the undersigned Notary Public, and stated that he executed such instrument on behalf of said corporation for the purpose and consideration therein expressed.

Frank Pavlich
Notary Public
My Commission Expires: 4-25-2015

"OFFICIAL SEAL"
Frank Pavlich
Notary Public - Arizona
Maricopa County
My Comm. Expires 4/25/2015

NON-COLLUSION AFFIDAVIT

I certify that this bid is genuine and is not in any way collusive or sham; that the bid is not with the intent to restrict or prohibit competition; that this firm has not revealed the contents of the bid to, or in any way colluded with, any other firm which may compete for the contract; and that no other firm which may compete for the contract has revealed the contents of a bid to, or in any way colluded with, this firm.

Name of Firm Submitting Bid: R K Sanders Inc

Address: P.O. Box 6686
Phx Az 85005

Telephone Number: [redacted]

Authorized Signature

This affidavit is required pursuant to Arizona Revised Statutes §34-253 and §41-2549. Failure to submit this affidavit signed at the time of bid opening is grounds for disqualification of the bid.

CITY CLERK
ORIGINAL

C-8122
08/14/2012

CONSTRUCTION AGREEMENT

This Construction Agreement ("Agreement") is entered into and effective between the CITY OF GLENDALE, an Arizona municipal corporation ("City"), and R K Sanders Inc , an Arizona corporation ("Contractor") as of the 14th day of August, 2012

RECITALS

A City intends to undertake a project for the benefit of the public and with public funds that is more fully set forth in the **Notice to Contractors** and the attached **Exhibit A** ("Project");

B. City desires to retain the services of Contractor to perform those specific duties and produce the specific work as set forth in the Project, the plans and specifications, the **Information for Bidders,** and the **Maricopa Association of Governments** ("MAG") **General and Supplemental Conditions and Provisions,**

C. City and Contractor desire to memorialize their agreement with this document.

AGREEMENT

In consideration of the Recitals, which are confirmed as true and correct and incorporated by this reference, the mutual promises and covenants contained in this Agreement, and other good and valuable consideration, City and Contractor agree as follows·

1. Project.

1.1 Scope. Contractor will provide all services and material necessary to assure the Project is completed timely and efficiently consistent with Project requirements, including, but not limited to, working in close interaction and interfacing with City and its designated employees, and working closely with others, including other contractors, providers or consultants retained by City.

1.2 Documents. The following documents are, by this reference, entirely incorporated into this Agreement and attached Exhibits as though fully set forth herein.

(A) Notice to Contractors;
(B) Information for Bidders,
(C) MAG General Conditions, Supplemental General Conditions, Special and Technical Provisions;
(D) Proposal;
(E) Bid Bond;
(F) Payment Bond;
(G) Performance Bond,
(H) Certificate of Insurance;
(I) Appendix; and
(J) Plans and Addenda thereto.

Should a conflict exist between this Agreement (and its attachments), and any of the incorporated documents as listed above, the provisions of this Agreement shall govern

1.3 Project Team.

(A) Project Manager Contractor will designate an employee as Project Manager with sufficient training, knowledge, and experience to, in the City's opinion, to complete the project and handle all aspects of the Project such that the work produced by Contractor is consistent with applicable standards as detailed in this Agreement.

(B) Project Team

(1) The Project manager and all other employees assigned to the project by Contractor will comprise the "Project Team."

(2) Project Manager will have responsibility for and will supervise all other employees assigned to the project by Contractor.

(C) Sub-contractors

(1) Contractor may engage specific technical contractor (each a "Sub-contractor") to furnish certain service functions.

(2) Contractor will remain fully responsible for Sub-contractor's services.

(3) Sub-contractors must be approved by the City, unless the Sub-contractor was previously mentioned in the response to the solicitation

(4) Contractor shall certify by letter that contracts with Sub-contractors have been executed incorporating requirements and standards as set forth in this Agreement.

2. **Schedule.** The Project will be undertaken in a manner that ensures it is completed in a timely and efficient manner If not otherwise stated in **Exhibit A**, the Project shall be completed by no later than within sixty (60) consecutive calendar days from and including the date of receipt of such Notice to Proceed

3. **Contractor's Work.**

3.1 **Standard.** Contractor must perform services in accordance with the standards of due diligence, care, and quality prevailing among contractors having substantial experience with the successful furnishing of services and materials for projects that are equivalent in size, scope, quality, and other criteria under the Project and identified in this Agreement

3.2 **Licensing.** Contractor warrants that.

(A) Contractor and Sub-contractors will hold all appropriate and required licenses, registrations and other approvals necessary for the lawful furnishing of services ("Approvals"), and

(B) Neither Contractor nor any Sub-contractor has been debarred or otherwise legally excluded from contracting with any federal, state, or local governmental entity ("Debarment").

(1) City is under no obligation to ascertain or confirm the existence or issuance of any Approvals or Debarments or to examine Contractor's contracting ability.

(2) Contractor must notify City immediately if any Approvals or Debarment changes during the Agreement's duration and the failure of the Contractor to notify City as required will constitute a material default of this Agreement.

3.3 **Compliance.** Services and materials will be furnished in compliance with applicable federal, state, county and local statutes, rules, regulations, ordinances, building codes, life safety codes, or other standards and criteria designated by City.

3.4 **Coordination; Interaction.**

(A) If the City determines that the Project requires the coordination of professional services or other providers, Contractor will work in close consultation with City to proactively interact with any other contractors retained by City on the Project ("Coordinating Entities").

(B) Subject to any limitations expressly stated in the budget, Contractor will meet to review the Project, schedules, budget, and in-progress work with Coordinating Entities and the City as often and for durations as City reasonably considers necessary in order to ensure the timely work delivery and Project completion

(C) If the Project does not involve Coordinating Entities, Contractor will proactively interact with any other contractors when directed by City to obtain or disseminate timely information for the proper execution of the Project

3.5 **Hazardous Substances.** Contractor is responsible for the appropriate handling, disposal of, and if necessary, any remediation and all losses and damages to the City, associated with the use or release of hazardous substances by Contractor in connection with completion of the Project.

3.6 **Warranties.** At any time within two years after completion of the Project, Contractor must, at Contractor's sole expense and within 20 days of written notice from the City, uncover, correct and remedy all defects in Contractor's work City will accept a manufacturer's warranty on approved equipment as satisfaction of the Contractor's warranty under this subsection

3.7. **Bonds.** Upon execution of this Agreement, and if applicable, Contractor must furnish Payment and Performance bonds as required under A R S § 34-608.

4. Compensation for the Project.

4.1 **Compensation.** Contractor's compensation for the Project, including those furnished by its Sub-contractors will not exceed $406,604 00, as specifically detailed in the Contractor's bid and set forth in **Exhibit B** ("Compensation")

4.2 **Change in Scope of Project.** The Compensation may be equitably adjusted if the originally contemplated scope of services as outlined in the Project is significantly modified by the City.

(A) Adjustments to the Scope or Compensation require a written amendment to this Agreement and may require City Council approval

(B) Additional services which are outside the scope of the Project and not contained in this Agreement may not be performed by the Contractor without prior written authorization from the City.

5. Billings and Payment.

5.1 **Applications.**

(A) The Contractor will submit monthly invoices (each, a "Payment Application") to City's Project Manager and City will remit payments based upon the Payment Application as stated below.

(B) The period covered by each Payment Application will be one calendar month ending on the last day of the month.

5.2 **Payment.**

(A) After a full and complete Payment Application is received, City will process and remit payment within 30 days.

(B) Payment may be subject to or conditioned upon City's receipt of:

(1) Completed work generated by Contractor and its Sub-contractors, and

(2) Unconditional waivers and releases on final payment from Sub-contractors as

City may reasonably request to assure the Project will be free of claims arising from required performances under this Agreement.

5.3 **Review and Withholding.** City's Project Manager will timely review and certify Payment Applications

(A) If the Payment Application is rejected, the Project Manager will issue a written listing of the items not approved for payment

(B) City may withhold an amount sufficient to pay expenses that City reasonably expects to incur in correcting the deficiency or deficiencies rejected for payment

(C) Contractor will provide, by separate cover, and concurrent with the execution of this Agreement, all required financial information to the City, including City of Glendale Transaction Privilege License and Federal Taxpayer identification numbers

(D) City will temporarily withhold Compensation amounts as required by A R.S. 34-221(C)

6. Termination.

6.1 **For Convenience.** City may terminate this Agreement for convenience, without cause, by delivering a written termination notice stating the effective termination date, which may not be less than 15 days following the date of delivery.

(A) Contractor will be equitably compensated any services and materials furnished prior to receipt of the termination notice and for reasonable costs incurred

(B) Contractor will also be similarly compensated for any approved effort expended and approved costs incurred that are directly associated with Project closeout and delivery of the required items to the City.

6.2 **For Cause.** City may terminate this Agreement for cause if Contractor fails to cure any breach of this Agreement within seven days after receipt of written notice specifying the breach

(A) Contractor will not be entitled to further payment until after City has determined its damages If City's damages resulting from the breach, as determined by City, are less than the equitable amount due but not paid Contractor for Service and Repair furnished, City will pay the amount due to Contractor, less City's damages

(B) If City's direct damages exceed amounts otherwise due to Contractor, Contractor must pay the difference to City immediately upon demand, however, Contractor will not be subject to consequential damages more than $1,000,000 or the amount of this Agreement, whichever is greater

7. Insurance.

7.1 **Requirements.** Contractor must obtain and maintain the following insurance ("Required Insurance")·

(A) Contractor and Sub-contractors Contractor, and each Sub-contractor performing work or providing materials related to this Agreement must procure and maintain the insurance coverages described below (collectively, "Contractor's Policies"), until each Parties' obligations under this Agreement are completed.

(B) General Liability.

(1) Contractor must at all times relevant hereto carry a commercial general liability policy with a combined single limit of at least $1,000,000 per occurrence and $2,000,000 annual aggregate

(2) Sub-contactors must at all times relevant hereto carry a general commercial liability policy with a combined single limit of at least $1,000,000 per occurrence

(3) This commercial general liability insurance must include independent contractors' liability, contractual liability, broad form property coverage, products and completed operations, XCU hazards if requested by the City, and a separation of insurance provision

(4) These limits may be met through a combination of primary and excess liability coverage

(C) Auto A business auto policy providing a liability limit of at least $1,000,000 per accident for Contractor and 1,000,000 per accident for Sub-contractors and covering owned, non-owned and hired automobiles

(D) Workers' Compensation and Employer's Liability A workers' compensation and employer's liability policy providing at least the minimum benefits required by Arizona law.

(E) Equipment Insurance Contractor must secure, pay for, and maintain all-risk insurance as necessary to protect the City against loss of owned, non-owned, rented or leased capital equipment and tools, equipment and scaffolding, staging, towers and forms owned or rented by Contractor or its Sub-contractors

(F) Notice of Changes Contractor's Policies must provide for not less than 30 days' advance written notice to City Representative of.

(1) Cancellation or termination of Contractor or Sub-contractor's Policies,

(2) Reduction of the coverage limits of any of Contractor or and Sub-contractor's Policies, and

(3) Any other material modification of Contractor or Sub-contractor's Policies related to this Agreement.

(G) Certificates of Insurance

(1) Within 10 business days after the execution of the Agreement, Contractor must deliver to City Representative certificates of insurance for each of Contractor and Sub-contractor's Policies, which will confirm the existence or issuance of Contractor and Sub-contractor's Policies in accordance with the provisions of this section, and copies of the endorsements of Contractor and Sub-contractor's Policies in accordance with the provisions of this section

(2) City is and will be under no obligation either to ascertain or confirm the existence or issuance of Contractor and Sub-contractor's Policies, or to examine Contractor and Sub-contractor's Policies, or to inform Contractor or Sub-contractor in the event that any coverage does not comply with the requirements of this section

(3) Contractor's failure to secure and maintain Contractor Policies and to assure Sub-contractor policies as required will constitute a material default under this Agreement

(H) Other Contractors or Vendors

(1) Other contractors or vendors that may be contracted by Contractor with in

connection with the Project must procure and maintain insurance coverage as is appropriate to their particular agreement

(2) This insurance coverage must comply with the requirements set forth above for Contractor's Policies (e g., the requirements pertaining to endorsements to name the parties as additional insured parties and certificates of insurance)

(I) Policies Except with respect to workers' compensation and employer's liability coverages, the City must be named and properly endorsed as additional insureds on all liability policies required by this section

(1) The coverage extended to additional insureds must be primary and must not contribute with any insurance or self insurance policies or programs maintained by the additional insureds

(2) All insurance policies obtained pursuant to this section must be with companies legally authorized to do business in the State of Arizona and acceptable to all parties

7.2 Sub-contractors.

(A) Contractor must also cause its Sub-contractors to obtain and maintain the Required Insurance.

(B) City may consider waiving these insurance requirements for a specific Sub-contractor if City is satisfied the amounts required are not commercially available to the Sub-contractor and the insurance the Sub-contractor does have is appropriate for the Sub-contractor's work under this Agreement

(C) Contractor and Sub-contractors must provide to the City proof of Required Insurance whenever requested

7.3 Indemnification.

(A) To the fullest extent permitted by law, Contractor must defend, indemnify, and hold harmless City and its elected officials, officers, employees and agents (each, an "Indemnified Party," collectively, the "Indemnified Parties"), for, from, and against any and all claims, demands, actions, damages, judgments, settlements, personal injury (including sickness, disease, death, and bodily harm), property damage (including loss of use), infringement, governmental action and all other losses and expenses, including attorneys' fees and litigation expenses (each, a "Demand or Expense", collectively, "Demands or Expenses") asserted by a third-party (i.e. a person or entity other than City or Contractor) and that arises out of or results from the breach of this Agreement by the Contractor or the Contractor's negligent actions, errors or omissions (including any Sub-contractor or other person or firm employed by Contractor), whether sustained before or after completion of the Project

(B) This indemnity and hold harmless provision applies even if a Demand or Expense is in part due to the Indemnified Party's negligence or breach of a responsibility under this Agreement, but in that event, Contractor shall be liable only to the extent the Demand or Expense results from the negligence or breach of a responsibility of Contractor or of any person or entity for whom Contractor is responsible

(C) Contractor is not required to indemnify any Indemnified Parties for, from, or against any Demand or Expense resulting from the Indemnified Party's sole negligence or other fault solely attributable to the Indemnified Party

7.4 Waiver of Subrogation. Contractor waives, and will require any Subcontractor to waive, all rights of subrogation against the City to the extent of all losses or damages covered by any policy

of insurance

8. **Immigration Law Compliance.**

8 1 Contractor, and on behalf any subcontractor, warrants, to the extent applicable under A.R S § 41-4401, compliance with all federal immigration laws and regulations that relate to their employees as well as compliance with A R.S § 23-214(A) which requires registration and participation with the E-Verify Program

8 2 Any breach of warranty under subsection 8 1 above is considered a material breach of this Agreement and is subject to penalties up to and including termination of this Agreement.

8 3 City retains the legal right to inspect the papers of any Contractor or subcontractor employee who performs work under this Agreement to ensure that the Contractor or any subcontractor is compliant with the warranty under subsection 8 1 above.

8 4 City may conduct random inspections, and upon request of City, Contractor shall provide copies of papers and records of Contractor demonstrating continued compliance with the warranty under subsection 9.1 above. Contractor agrees to keep papers and records available for inspection by the City during normal business hours and will cooperate with City in exercise of its statutory duties and not deny access to its business premises or applicable papers or records for the purposes of enforcement of this section 9.

8 5 Contractor agrees to incorporate into any subcontracts under this Agreement the same obligations imposed upon Contractor and expressly accrue those obligations directly to the benefit of the City Contractor also agrees to require any subcontractor to incorporate into each of its own subcontracts under this Agreement the same obligations above and expressly accrue those obligations to the benefit of the City

8.6 Contractor's warranty and obligations under this section to the City is continuing throughout the term of this Agreement or until such time as the City determines, in its sole discretion, that Arizona law has been modified in that compliance with this section is no longer a requirement

8.7 The "E-Verify Program" above means the employment verification program administered by the United States Department of Homeland Security, the Social Security Administration, or any successor program

9. **Conflict.** Contractor acknowledges this Agreement is subject to A R.S. § 38-511, which allows for cancellation of this Agreement in the event any person who is significantly involved in initiating, negotiating, securing, drafting, or creating the Agreement on City's behalf is also an employee, agent, or consultant of any other party to this Agreement.

10. **Prohibitions.** Contractor certifies under A R S. §§ 35-391 *et seq.* and 35-393 *et seq* , that it does not have, and during the term of this Agreement will not have "scrutinized" business operations, as defined in the preceding statutes, in the countries of Sudan or Iran

11. **Non-Discrimination Policies.** Contractor must not discriminate against any employee or applicant for employment on the basis of race, religion, color sex or national origin. Contractor must develop, implement and maintain non-discrimination policies and post the policies in conspicuous places visible to employees and applicants for employment Contractor will require any Sub-contractor to be bound to the same requirements as stated within this section

12. **Notices.**

12 1 A notice, request or other communication that is required or permitted under this Agreement (each a "Notice") will be effective only if

(A) The Notice is in writing, and

(B) Delivered in person or by private express overnight delivery service (delivery charges prepaid), certified or registered mail (return receipt requested).

(C) Notice will be deemed to have been delivered to the person to whom it is addressed as of the date of receipt, if

(1) Received on a business day, or before 5 00 p m., at the address for Notices identified for the Party in this Agreement by U S. Mail, hand delivery, or overnight courier on or before 5·00 p m , or

(2) As of the next business day after receipt, if received after 5 00 p m

(D) The burden of proof of the place and time of delivery is upon the Party giving the Notice.

(E) Digitalized signatures and copies of signatures will have the same effect as original signatures

12 2 **Representatives.**

(A) Contractor. Contractor's representative ("Contractor's Representative") authorized to act on Contractor's behalf with respect to the Project, and his or her address for Notice delivery is·

Robert K Sanders
R K Sanders Inc.
P.O Box 6686
Phoenix, AZ 85005

(B) City. City's representative ("City's Representative") authorized to act on City's behalf, and his or her address for Notice delivery is:

City of Glendale
Attn. Bill Passmore
5850 West Glendale Avenue
Glendale, Arizona 85301

With required copies to:

City of Glendale
City Manager
5850 West Glendale Avenue
Glendale, Arizona 85301

City of Glendale
City Attorney
5850 West Glendale Avenue
Glendale, Arizona 85301

(C) Concurrent Notices.

(1) All notices to City's representative must be given concurrently to City Manager and City Attorney.

(2) A notice will not be considered to have been received by City's representative until the time that it has also been received by City Manager and City Attorney.

(3) City may appoint one or more designees for the purpose of receiving notice by delivery of a written notice to Contractor identifying the designee(s) and their respective addresses for notices

(D) **Changes.** Contractor or City may change its representative or information on Notice, by giving Notice of the change in accordance with this section at least ten days prior to the change

13. **Financing Assignment.** City may assign this Agreement to any City-affiliated entity, including a non-profit corporation or other entity whose primary purpose is to own or manage the Project.

14. **Entire Agreement; Survival; Counterparts; Signatures.**

14.1 **Integration.** This Agreement contains, except as stated below, the entire agreement between City and Contractor and supersedes all prior conversations and negotiations between the parties regarding the Project or this Agreement

(A) Neither Party has made any representations, warranties or agreements as to any matters concerning the Agreement's subject matter

(B) Representations, statements, conditions, or warranties not contained in this Agreement will not be binding on the parties

(C) Any solicitation, addendums and responses submitted by the Contractor are incorporated fully into this Agreement as Exhibit A. Any inconsistency between Exhibit A and this Agreement will be resolved by the terms and conditions stated in this Agreement

14.2 **Interpretation.**

(A) The parties fairly negotiated the Agreement's provisions to the extent they believed necessary and with the legal representation they deemed appropriate

(B) The parties are of equal bargaining position and this Agreement must be construed equally between the parties without consideration of which of the parties may have drafted this Agreement

(C) The Agreement will be interpreted in accordance with the laws of the State of Arizona

14.3 **Survival.** Except as specifically provided otherwise in this Agreement each warranty, representation, indemnification and hold harmless provision, insurance requirement, and every other right, remedy and responsibility of a Party, will survive completion of the Project, or the earlier termination of this Agreement.

14.4 **Amendment.** No amendment to this Agreement will be binding unless in writing and executed by the parties Any amendment may be subject to City Council approval.

14.5 **Remedies.** All rights and remedies provided in this Agreement are cumulative and the exercise of any one or more right or remedy will not affect any other rights or remedies under this Agreement or applicable law.

14.6 **Severability.** If any provision of this Agreement is voided or found unenforceable, that determination will not affect the validity of the other provisions, and the voided or unenforceable provision will be reformed to conform to applicable law.

14.7 **Counterparts.** This Agreement may be executed in counterparts, and all counterparts will together comprise one instrument

15. **Dispute Resolution.** Each claim, controversy and dispute ("Dispute") between Contractor and City will be resolved in accordance with Exhibit C The final determination will be made by the City.

16. **Exhibits.** The following exhibits, with reference to the term in which they are first referenced, are incorporated by this reference

Exhibit A	Project
Exhibit B	Compensation
Exhibit C	Dispute Resolution

The parties enter into this Agreement as of the date shown above

City of Glendale,
an Arizona municipal corporation

By. Horatio Skeete
Its Acting City Manager

ATTEST

City Clerk (SEAL)

APPROVED AS TO FORM

City Attorney

R K SANDERS INC
an Arizona corporation

By Robert K. Sanders
Its. President

WOMEN-OWNED/MINORITY BUSINESS [ ] YES [✓] NO [redacted]
CITY OF GLENDALE TRANSACTION PRIVILEGE TAX NO [redacted]
FEDERAL TAXPAYER IDENTIFICATION NO ____ [redacted]

EXHIBIT A
CONSTRUCTION AGREEMENT

PROJECT

This work is for the construction of asphalt blast pads at each end of the runway, relocation of an existing blast deflector fence, ramp marking improvements and the relocation of an existing windcone.

EXHIBIT B
CONSTRUCTION AGREEMENT

COMPENSATION

METHOD AND AMOUNT OF COMPENSATION

By bid, including all services, materials and costs.

NOT-TO-EXCEED AMOUNT

The total amount of compensation paid to Contractor for full completion of all work required by the Project during the entire term of the Project must not exceed $406,604.

DETAILED PROJECT COMPENSATION

Per Page 182 of the Bid Schedule

EXHIBIT C
CONSTRUCTION AGREEMENT

DISPUTE RESOLUTION

1. Disputes.

1 1 Commitment. The parties commit to resolving all disputes promptly, equitably, and in a good-faith, cost-effective manner.

1 2 Application The provisions of this Exhibit will be used by the parties to resolve all controversies, claims, or disputes ("Dispute") arising out of or related to this Agreement-including Disputes regarding any alleged breaches of this Agreement

1 3 Initiation A party may initiate a Dispute by delivery of written notice of the Dispute, including the specifics of the Dispute, to the Representative of the other party as required in this Agreement.

1 4 Informal Resolution When a Dispute notice is given, the parties will designate a member of their senior management who will be authorized to expeditiously resolve the Dispute.

(A) The parties will provide each other with reasonable access during normal business hours to any and all non-privileged records, information and data pertaining to any Dispute in order to assist in resolving the Dispute as expeditiously and cost effectively as possible;

(B) The parties' senior managers will meet within 10 business days to discuss and attempt to resolve the Dispute promptly, equitably, and in a good faith manner, and

(C) The Senior Managers will agree to subsequent meetings if both parties agree that further meetings are necessary to reach a resolution of the Dispute

2. Arbitration.

2.1 Rules If the parties are unable to resolve the Dispute by negotiation within 30 days from the Dispute notice, and unless otherwise informal discussions are extended by the mutual agreement, the Dispute will be decided by binding arbitration in accordance with Construction Industry Rules of the AAA, as amended herein Although the arbitration will be conducted in accordance with AAA Rules, it will not be administered by the AAA, but will be heard independently.

(A) The parties will exercise best efforts to select an arbitrator within 5 business days after agreement for arbitration. If the parties have not agreed upon an arbitrator within this period, the parties will submit the selection of the arbitrator to one of the principals of the mediation firm of Scott & Skelly, LLC, who will then select the arbitrator The parties will equally share the fees and costs incurred in the selection of the arbitrator

(B) The arbitrator selected must be an attorney with at least 15 years experience with commercial construction legal matters in Maricopa County, Arizona, be independent, impartial, and not have engaged in any business for or adverse to either Party for at least 10 years

2 2 Discovery. The extent and the time set for discovery will be as determined by the arbitrator. Each Party must, however, within ten (10) days of selection of an arbitrator deliver to the other Party copies of all documents in the delivering party's possession that are relevant to the dispute

2 3 Hearing The arbitration hearing will be held within 90 days of the appointment of the arbitrator The arbitration hearing, all proceedings, and all discovery will be conducted in Glendale, Arizona unless otherwise agreed by the parties or required as a result of witness location. Telephonic hearings and other reasonable arrangements may be used to minimize costs

2 4 Award. At the arbitration hearing, each Party will submit its position to the arbitrator, evidence to support that position, and the exact award sought in this matter with specificity The arbitrator must select the award sought by one of the parties as the final judgment and may not independently alter or modify the awards sought by the parties, fashion any remedy, or make any equitable order The arbitrator has no authority to consider or award punitive damages

2 5 Final Decision The Arbitrator's decision should be rendered within 15 days after the arbitration hearing is concluded This decision will be final and binding on the Parties

2 6 Costs The prevailing party may enter the arbitration in any court having jurisdiction in order to convert it to a judgment The non-prevailing party shall pay all of the prevailing party's arbitration costs and expenses, including reasonable attorney's fees and costs.

3. Services to Continue Pending Dispute. Unless otherwise agreed to in writing, Contractor must continue to perform and maintain progress of required services during any Dispute resolution or arbitration proceedings, and City will continue to make payment to Contractor in accordance with this Agreement.

4. Exceptions.

4.1 Third Party Claims. City and Contractor are not required to arbitrate any third-party claim, cross-claim, counter claim, or other claim or defense of a third-party who is not obligated by contract to arbitrate disputes with City and Contractor

4 2 Liens City or Contractor may commence and prosecute a civil action to contest a lien or stop notice, or enforce any lien or stop notice, but only to the extent the lien or stop notice the Party seeks to enforce is enforceable under Arizona Law, including, without limitation, an action under A.R.S § 33-420, without the necessity of initiating or exhausting the procedures of this Exhibit

4 3 Governmental Actions This Exhibit does not apply to, and must not be construed to require arbitration of, any claims, actions or other process filed or issued by City of Glendale Building Safety Department or any other agency of City acting in its governmental permitting or other regulatory capacity

BOND NO. LAX750710

CONTRACT BOND
STATUTORY PERFORMANCE BOND PURSUANT TO TITLE 34, CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES
(Penalty of this Bond must be 100% of the Contract Amount)

KNOW ALL MEN BY THESE PRESENTS:

That, **R K SANDERS, INC.** (hereinafter called the Principal), as Principal, and **American Safety Casualty Insurance Company**, a corporation organized and existing under the laws of the State of Oklahoma with its principal office in the City of Calabasas, CA, (hereinafter called the Surety), as Surety, are held and firmly bound unto the **City of Glendale**, (hereinafter called the Obligee), in the amount of **FOUR HUNDRED SIX THOUSAND SIX HUNDRED FOUR AND NO/100'S DOLLARS ($406,604.00)**, for the payment thereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, **2012**, to construct

Project 091005
GLENDALE MUNICIPAL AIRPORT RUNWAY SAFETY IMPROVEMENTS
AIP No. 3-04-0064-20
ADOT No EIF27

for which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the said Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term of said contract any extension thereof, with or without notice to the Surety, and during the life of any guaranty required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of any all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the Surety being hereby waived; then the above obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, and all liabilities on this Bond shall be determined in accordance with the provisions of said Title, Chapter, and Article, to the extent as if it were copied at length herein.

THE prevailing party in a suit on this Bond shall be entitled to such reasonable attorney's fees as may be fixed by a judge of the Court.

WITNESS our hands this 4th day of September, 2012.

R K SANDERS, INC.
PRINCIPAL SEAL

By _____
Robert K Sanders, President

American Safety Casualty Insurance Company
SURETY SEAL

A.M. BEST RATING: **A**

By _____
Ed Fancher, ATTORNEY-IN-FACT

Fancher Bonding
AGENT OF RECORD

1030 E Baseline Rd #105-1071, Tempe, AZ 85283
AGENT ADDRESS

480-456-0894
TELEPHONE NUMBER

By _____
Edward A Fancher, III, ARIZONA RESIDENT AGENT

BOND NO. LAX750710

LABOR AND MATERIALS BOND
STATUTORY PAYMENT BOND PURSUANT TO
TITLE 34, CHAPTER 2, ARTICLE 2, OF THE ARIZONA REVISED STATUTES

(Penalty of this Bond must be 100% of the Contract Amount)

KNOW ALL MEN BY THESE PRESENTS:

That, **R K SANDERS, INC.**, (hereinafter called the Principal), as Principal, and American Safety Casualty Insurance Company, a corporation organized and existing under the laws of the State of Oklahoma, with its principal office in the City of Calabasas, CA, (hereinafter called the Surety), as Surety, are held and firmly bound unto the **City of Glendale** in the County of Maricopa, State of Arizona, (hereinafter called the Obligee), in the amount of, **FOUR HUNDRED SIX THOUSAND SIX HUNDRED FOUR AND NO/ 100'S DOLLARS ($406,604.00)**, for the payment thereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these present.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the _____ day of _____, **2012**, to construct

Project 091005
GLENDALE MUNICIPAL AIRPORT RUNWAY SAFETY IMPROVEMENTS
AIP No. 3-04-0064-20
ADOT No EIF27

for which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that, if the said Principal shall promptly pay all moneys due to all persons supplying labor or materials to him or his subcontractors in the prosecution of the work provided for in said contract, then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, of the Arizona Revised Statutes, and all liabilities on this Bond shall be determined in accordance with the provisions of said Title, Chapter, and Article, to the extent as if it were copied at length herein.

THE prevailing party in a suit on this Bond shall be entitled to such reasonable attorney's fees as may be fixed by a judge of the Court.

WITNESS our hands this 4th day of September, 2012.

R K SANDERS, INC.
PRINCIPAL SEAL

By: _____
Robert K Sanders, President

Fancher Bonding
AGENT OF RECORD

1030 E Baseline Rd #105-1071, Tempe, AZ85283
AGENT ADDRESS

American Safety Casualty Insurance Company
SURETY SEAL

480-456-0894
TELEPHONE NUMBER

A.M. BEST RATING: **A**

By: _____
Ed Fancher, ATTORNEY-IN-FACT

By: _____
Edward A Fancher, III, ARIZONA RESIDENT AGENT

AMERICAN SAFETY INSURANCE

NUMBER
LAX750710

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS that American Safety Casualty Insurance Company has made, constituted and appointed, and by these presents does make, constitute and appoints

Ed Fancher

its true and lawful attorney-in-fact, for it and its name, place, and stead to execute on behalf of the said Company, as surety, bonds, undertaking and contracts of suretyship to be given to

ALL OBLIGEES

provided that no bond or undertaking or contract of suretyship executed under this authority shall exceed in amount the sum of

Four Hundred Six Thousand Six Hundred Four Dollars ($406,604 00)

This Power of Attorney is granted and is signed and sealed by facsimile under and by the authority of the following Resolution adopted by the Board of Directors of the Company of the 6th day of August, 2009.

RESOLVED, that the President in conjunction with the Secretary or any Assistant Secretary may appoint attorneys-in-fact or agents with authority as defined or limited in the instrument evidencing the appointment in each case, for and on behalf of the Company, to execute and deliver and affix the seal of the Company to bands, undertakings, recognizances, and suretyship obligations of all kinds, and said officers may remove any such attorney-in-fact or agent and revoke any power of attorney previously granted to such persons

RESOLVED FURTHER, that any bond, undertaking, recognizance, or suretyship obligation shall be valid and binding upon the company when (i) when signed by the President or any Vice-President and attested and sealed (if a seal is required) by any Secretary or Assistant Secretary or (ii) when signed by the President or any Vice-President or Secretary or Assistant Secretary, and counter-signed and sealed (if a seal is required) by a duly authorized attorney-in-fact or agent, or (iii) when duly executed and sealed (if a seal is required) by one or more attorney-in-fact or agents pursuant to and within the limits of the authority evidenced by the power of attorney issued by the Company to such person or persons.

RESOLVED FURTHER, that the signature of any authorized officer and the seal of the Company may be affixed by facsimile to any power of attorney or certification thereof authorizing the execution and delivery of any bond, undertaking, recognizance, or other suretyship obligations of the Company, and such signature and seal when so used shall have the same force and effects as though manually affixed.

IN WITNESS WHEREOF, American Safety Casualty Insurance Company has caused its official seal to be hereunto affixed, and these presents to be signed by its President and attested by its Secretary this 6th day of August, 2009

Attest:

Ambuj Jain

Joseph D. Scollo, Jr.

STATE OF GEORGIA)
)
COUNTY OF COBB)

On this 6th day of August, 2009, before me personally came Joseph D. Scollo, Jr., to me known, who, being by me duly sworn, did depose and say that he is the President of American Safety Casualty Insurance Company, the corporation described in and which executed the above instrument, that he knows the seal of the said corporation, that the seal affixed to the said instrument is such corporate seal, that is was so affixed by order of the Board of Directors of said corporation and that he signed his name thereto by like order.

JAMI BAILEY
Notary Public, Hall Co , GA
My Commission Expires Aug. 13, 2012

Jami Bailey, Notary Public

I, the undersigned, Secretary of American Safety Casualty Insurance Company, an Oklahoma corporation, DO HEREBY CERTIFY, that the foregoing and attached Power of Attorney remains in full force and has not been revoked; and furthermore that the Resolution of the Board of Directors, set forth in the said Power of Attorney, is now in force.

Signed and sealed in the City of Atlanta, in the State of Georgia

Dated this 4 day of September 2012

Ambuj Jain

ORIGINALS OF THIS POWER OF ATTORNEY ARE PRINTED WITH RED NUMERICAL NUMBERS
DUPLICATES SHALL HAVE THE SAME FORCE AND EFFECT AS AN ORIGINAL ONLY WHEN ISSUED IN CONJUCTION WITH THE ORIGINAL

091005

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 09/06/2012

PRODUCER (480) 986-4400
Cook Insurance, Inc.
11512 E. Apache Trail

Apache Junction AZ 85120-3523

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURED
RK Sanders Inc.
PO BOX 6686

Phoenix AZ 85005-

RECEIVED SEP 25 2012 Engineering Dept

INSURERS AFFORDING COVERAGE	NAIC #
INSURER A AMCO INS CO.	
INSURER B WESTERN HERITAGE	
INSURER C AUTO OWNERS	
INSURER D	
INSURER E	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
B	X	GENERAL LIABILITY	SCP0873365	10/11/2011	10/11/2012	EACH OCCURRENCE	$ 1,000,000
		X COMMERCIAL GENERAL LIABILITY				DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 100,000
		CLAIMS MADE X OCCUR		/ /	/ /	MED EXP (Any one person)	$ 5,000
		X BLANKET ADD INS				PERSONAL & ADV INJURY	$ 1,000,000
				/ /	/ /	GENERAL AGGREGATE	$ 2,000,000
		GEN'L AGGREGATE LIMIT APPLIES PER				PRODUCTS - COMP/OP AGG	$ 2,000,000
		X POLICY PRO-JECT LOC		/ /	/ /		
A		AUTOMOBILE LIABILITY		/ /	/ /	COMBINED SINGLE LIMIT (Ea accident)	$ 1,000,000
		ANY AUTO					
		ALL OWNED AUTOS	ACP7204437013	05/10/2012	05/10/2013	BODILY INJURY (Per person)	$
		X SCHEDULED AUTOS					
		X HIRED AUTOS		/ /	/ /	BODILY INJURY (Per accident)	$
		X NON-OWNED AUTOS					
				/ /	/ /	PROPERTY DAMAGE (Per accident)	$
		GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
		ANY AUTO		/ /	/ /	OTHER THAN AUTO ONLY EA ACC	$
						AGG	$
		EXCESS/UMBRELLA LIABILITY		/ /	/ /	EACH OCCURRENCE	$
		OCCUR CLAIMS MADE				AGGREGATE	$
							$
		DEDUCTIBLE		/ /	/ /		$
		RETENTION $					$
C		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY	45134998	09/13/2011	09/13/2013	X WC STATU-TORY LIMITS OTH-ER	
		ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED?				E L EACH ACCIDENT	$ 1,000,000
		If yes, describe under SPECIAL PROVISIONS below		/ /	/ /	E L DISEASE - EA EMPLOYEE	$ 1,000,000
						E L DISEASE - POLICY LIMIT	$ 1,000,000
		OTHER		/ /	/ /		
				/ /	/ /		
				/ /	/ /		

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

GL BLANKET ADDITIONAL INSURED FORM WHI 21-0517 APPLIES. RE:GLENDALE MUNICIPAL AIRPORT RUNWAY SAFETY IMPORVEMENT PROJECT

CERTIFICATE HOLDER

( ) - ( ) -

CITY OF GLENDALE, ARIZONA
ATTN: ENGINEERING DEPT
5850 WEST GLENDALE AVE
GLENDALE AZ 85301-

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES

AUTHORIZED REPRESENTATIVE Karen A Parks

© ACORD CORPORATION 1988

CITY OF GLENDALE, ARIZONA
PUBLIC WORKS/ENGINEERING DEPARTMENT

CONTRACTOR'S AFFIDAVIT
REGARDING
SETTLEMENT OF CLAIMS

PROJECT 0910005 - RUNWAY SAFETY IMPROVEMENTS

To the City of Glendale, Arizona

Gentlemen:

This is to certify that all lawful claims for materials, rental of equipment and labor used in connection with the construction of the above project, whether by subcontractor or claimant in person, have been duly discharged.

The undersigned, for the consideration of $_____ , as set out in the final pay estimate, as full and complete payment under the terms of the contract, hereby waives and relinquishes any and all further claims or right of lien under, in connection with, or as a result of the above described project. The undersigned further agrees to indemnify and save harmless the City of Glendale against any and all liens, claims of liens, suits, actions, damages, charges, costs, litigation expenses, attorneys' fees and any other and expenses whatsoever, which said City may suffer arising out of the failure of the undersigned to pay for all labor performance and materials furnished for the performance of said installation.

Signed and dated at _____ , this _____ day of _____ , 20___.

_____
Contractor

By _____

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

The foregoing instrument was subscribed and sworn to before me this ___ day of _____, 20___.

_____
Notary Public

My Commission Expires: _____

U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: Operational Safety on Airports During Construction

Date: 9/29/11

Initiated by: AAS-100

AC No: 150/5370-2F

1. **Purpose.** This AC sets forth guidelines for operational safety on airports during construction.

2. **What this AC Cancels.** This AC cancels AC 150/5370-2E, Operational Safety on Airports During Construction, dated January 17, 2003

3. **Whom This AC Affects.** This AC assists airport operators in complying with Title 14 Code of Federal Regulations (CFR) Part 139, Certification of Airports (Part 139). For those certificated airports, this AC provides one way, but not the only way, of meeting those requirements. The use of this AC is mandatory for those airport construction projects receiving funds under the Airport Improvement Program (AIP) or the Passenger Facility Charge (PFC) Program See Grant Assurance No. 34, "Policies, Standards, and Specifications," and PFC Assurance No. 9, "Standard and Specifications." While we do not require non-certificated airports without grant agreements to adhere to these guidelines, we recommend that they do so to help these airports maintain operational safety during construction

4. **Principal Changes.**

   a. Construction activities are prohibited in safety areas while the associated runway or taxiway is open to aircraft.

   b. Guidance is provided in incorporating Safety Risk Management.

   c. Recommended checklists are provided for writing Construction Safety and Phasing Plans and for daily inspections.

5. **Reading Material Related to this AC.** Numerous ACs are referenced in the text of this AC. These references do not include a revision letter, as they are to be read as referring to the latest version. Appendix 1 contains a list of reading material on airport construction, design, and potential safety hazards during construction, as well as instructions for obtaining these documents.

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

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Chapter 1. Planning an Airfield Construction Project

101. Overview. Airports are complex environments, and procedures and conditions associated with construction activities often affect aircraft operations and can jeopardize operational safety. Safety considerations are paramount and may make operational impacts unavoidable. However, careful planning, scheduling, and coordination of construction activities can minimize disruption of normal aircraft operations and avoid situations that compromise the airport's operational safety The airport operator must understand how construction activities and aircraft operations affect one another to be able to develop an effective plan to complete the project While the guidance in this AC is primarily used for construction operations, some of the concepts, methods and procedures described may also enhance the day-to-day airport maintenance operations, such as lighting maintenance and snow removal operations

102. Plan for Safety. Safety, maintaining aircraft operations, and construction costs are all interrelated Since safety must not be compromised, the airport operator must strike a balance between maintaining aircraft operations and construction costs. This balance will vary widely depending on the operational needs and resources of the airport and will require early coordination with airport users and the FAA. As the project design progresses, the necessary construction locations, activities, and associated costs will be identified As they are identified, their impact to airport operations must be assessed. Adjustments are made to the proposed construction activities, often by phasing the project, and/or to airport operations in order to maintain operational safety. This planning effort will ultimately result in a project Construction Safety and Phasing Plan (CSPP) The development of the CSPP takes place through the following five steps:

a. Identify Affected Areas. The airport operator must determine the geographic areas on the airport affected by the construction project. Some, such as a runway extension, will be defined by the project. Others may be variable, such as the location of haul routes and material stockpiles.

b. Describe Current Operations. Identify the normal airport operations in each affected area for each phase of the project. This becomes the baseline from which the impact on operations by construction activities can be measured This should include a narrative of the typical users and aircraft operating within the affected areas. It should also include information related to airport operations the Aircraft Reference Code (ACRC) for each runway; Airplane Design Group (ADG) and Taxiway Design Group (TDG)[1] for each affected taxiway; designated approach visibility minimums; available approach and departure procedures, most demanding aircraft, declared distances, available air traffic control services; airport Surface Movement Guidance and Control System plan; and others. The applicable seasons, days and times for certain operations should also be identified as applicable.

c. Allow for Temporary Changes to Operations. To the extent practical, current airport operations should be maintained during the construction. In consultation with airport users, Aircraft Rescue and Fire Fighting (ARFF) personnel, and FAA Air Traffic Organization (ATO) personnel, the airport operator should identify and prioritize the airport's most important operations. The construction activities should be planned, through project phasing if necessary, to safely accommodate these operations When the construction activities cannot be adjusted to safely maintain current operations, regardless of their importance, then the operations must be revised accordingly Allowable changes include temporary revisions to approach procedures, restricting certain aircraft to specific runways and taxiways, suspension of certain operations, decreased weights for some aircraft due to shortened runways,

[1] Taxiway Design Group will be introduced in AC 150/5300-13A

and other changes. An example of a table showing temporary operations versus current operations is shown in Table 3-1 Sample Operations Effects

d. Take Required Measures to Revised Operations. Once the level and type of aircraft operations to be maintained are identified, the airport operator must determine the measures required to safely conduct the planned operations during the construction. These measures will result in associated costs, which can be broadly interpreted to include not only direct construction costs, but also loss of revenue from impacted operations. Analysis of costs may indicate a need to reevaluate allowable changes to operations. As aircraft operations and allowable changes will vary so widely among airports, this AC presents general guidance on those subjects.

e. Manage Safety Risk. Certain airport projects may require the airport operator to provide a Project Proposal Summary to help the FAA to determine the appropriate level of Safety Risk Management (SRM) documentation. The airport operator must coordinate with the appropriate FAA Airports Regional or District Office early in the development of the CSPP to determine the need for SRM documentation. See FAA Order 5200 11, FAA Airports (ARP) Safety Management System (SMS), for more information If the FAA requires SRM documentation, the airport operator must at a minimum:

(1) Notify the appropriate FAA Airports Regional or District Office during the project "scope development" phase of any project requiring a CSPP.

(2) Provide documents identified by the FAA as necessary to conduct SRM.

(3) Participate in the SRM process for airport projects.

(4) Provide a representative to participate on the SRM panel

(5) Ensure that all applicable SRM identified risks elements are recorded and mitigated within the CSPP.

103. Develop a Construction Safety and Phasing Plan (CSPP). Development of an effective CSPP will require familiarity with many other documents referenced throughout this AC. See Appendix 1, Related Reading Material for a list of related reading material.

a. List Requirements. A CSPP must be developed for each on-airfield construction project funded by the Airport Improvement Program (AIP) or the Passenger Facility Charge (PFC) program or located on an airport certificated under Part 139. As per Order 5200.11, such projects do not include construction, rehabilitation, or change of any facility that is entirely outside the air operations area, does not involve any expansion of the facility envelope and does not involve construction equipment, haul routes or placement of material in locations that require access to the air operations area, increase the facility envelope, or impact line-of-sight. Such facilities may include passenger terminals and parking or other structures. However, extraordinary circumstances may trigger the need for a Safety Assessment and a CSPP. The CSPP is subject to subsequent review and approval under the FAA's Safety Risk Management procedures (see paragraph 102.e above). Additional information may be found in Order 5200.11.

b. Prepare a Safety Plan Compliance Document. The Safety Plan Compliance Document (SPCD) details how the contractor will comply with the CSPP. Also, it will not be possible to determine all safety plan details (for example specific hazard equipment and lighting, contractor's points of contact, construction equipment heights) during the development of the CSPP. The successful contractor must define such details by preparing an SPCD that the airport operator reviews for approval prior to issuance of a notice-to-proceed. The SPCD is a subset of the CSPP, similar to how a shop drawing review is a subset to the technical specifications.

c. Assume Responsibility for the CSPP. The airport operator is responsible for establishing and enforcing the CSPP. The airport operator may use the services of an engineering consultant to help develop the CSPP. However, writing the CSPP cannot be delegated to the construction contractor. Only those details the airport operator determines cannot be addressed before contract award are developed by the contractor and submitted for approval as the SPCD. The SPCD does not restate nor propose differences to provisions already addressed in the CSPP.

104. Who Is Responsible for Safety During Construction?

a. Establish a Safety Culture. Everyone has a role in operational safety on airports during construction: the airport operator, the airport's consultants, the construction contractor and subcontractors, airport users, airport tenants, ARFF personnel, Air Traffic personnel, including Technical Operations personnel, FAA Airports Division personnel, and others Close communication and coordination between all affected parties is the key to maintaining safe operations. Such communication and coordination should start at the project scoping meeting and continue through the completion of the project. The airport operator and contractor should conduct onsite safety inspections throughout the project and immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change

b. Assess Airport Operator's Responsibilities. An airport operator has overall responsibility for all activities on an airport, including construction. This includes the predesign, design, preconstruction, construction, and inspection phases. Additional information on the responsibilities listed below can be found throughout this AC The airport operator must:

(1) Develop a CSPP that complies with the safety guidelines of Chapter 2, Construction Safety and Phasing Plans, and Chapter 3, Guidelines for Writing a CSPP. The airport operator may develop the CSPP internally or have a consultant develop the CSPP for approval by the airport operator For tenant sponsored projects, approve a CSPP developed by the tenant or its consultant.

(2) Require, review and approve the SPCD by the contractor that indicates how it will comply with the CSPP and provides details that cannot be determined before contract award.

(3) Convene a preconstruction meeting with the construction contractor, consultant, airport employees and, if appropriate, tenant sponsor and other tenants to review and discuss project safety before beginning construction activity The appropriate FAA representatives should be invited to attend the meeting. See AC 150/5300-9, *Predesign, Prebid, and Preconstruction Conferences for Airport Grant Projects*. (Note "FAA" refers to the Airports Regional or District Office, the Air Traffic Organization, Flight Standards Service, and other offices that support airport operations, flight regulations, and construction/environmental policies.)

(4) Ensure contact information is accurate for each representative/point of contact identified in the CSPP and SPCD

(5) Hold weekly or, if necessary, daily safety meetings with all affected parties to coordinate activities

(6) Notify users, ARFF personnel, and FAA ATO personnel of construction and conditions that may adversely affect the operational safety of the airport via Notices to Airmen (NOTAM) and other methods, as appropriate Convene a meeting for review and discussion if necessary.

(7) Ensure construction personnel know of any applicable airport procedures and of changes to those procedures that may affect their work.

(8) Ensure construction contractors and subcontractors undergo training required by the CSPP and SPCD.

(9) Ensure vehicle and pedestrian operations addressed in the CSPP and SPCD are coordinated with airport tenants, the airport traffic control tower (ATCT), and construction contractors.

(10) At certificated airports, ensure each CSPP and SPCD is consistent with Part 139.

(11) Conduct inspections sufficiently frequently to ensure construction contractors and tenants comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

(12) Resolve safety deficiencies immediately. At airports subject to 49 CFR Part 1542, Airport Security, ensure construction access complies with the security requirements of that regulation.

(13) Notify appropriate parties when conditions exist that invoke provisions of the CSPP and SPCD (for example, implementation of low-visibility operations).

(14) Ensure prompt submittal of a Notice of Proposed Construction or Alteration (Form 7460-1) for conducting an aeronautical study of potential obstructions such as tall equipment (cranes, concrete pumps, other.), stock piles, and haul routes. A separate form may be filed for each potential obstruction, or one form may be filed describing the entire construction area and maximum equipment height. In the latter case, a separate form must be filed for any object beyond or higher than the originally evaluated area/height. The FAA encourages online submittal of forms for expediency. The appropriate FAA Airports Regional or District Office can provide assistance in determining which objects require an aeronautical study

(15) Promptly notify the FAA Airports Regional or District Office of any proposed changes to the CSPP prior to implementation of the change. Changes to the CSPP require review and approval by the airport operator and the FAA. Coordinate with appropriate local and other federal government agencies, such as EPA, OSHA, TSA, and the state environmental agency.

c. Define Construction Contractor's Responsibilities. The contractor is responsible for complying with the CSPP and SPCD. The contractor must:

(1) Submit a Safety Plan Compliance Document (SPCD) to the airport operator describing how it will comply with the requirements of the CSPP and supplying any details that could not be determined before contract award. The SPCD must include a certification statement by the contractor that indicates it understands the operational safety requirements of the CSPP and it asserts it will not deviate from the approved CSPP and SPCD unless written approval is granted by the airport operator Any construction practice proposed by the contractor that does not conform to the CSPP and SPCD may impact the airport's operational safety and will require a revision to the CSPP and SPCD and re-coordination with the airport operator and the FAA in advance.

(2) Have available at all times copies of the CSPP and SPCD for reference by the airport operator and its representatives, and by subcontractors and contractor employees.

(3) Ensure that construction personnel are familiar with safety procedures and regulations on the airport. Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Many projects will require 24-hour coverage.

(4) Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site whenever active construction is taking place.

(5) Conduct inspections sufficiently frequently to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards

(6) **Restrict movement of construction vehicles and personnel** to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate and as specified in the CSPP and SPCD

(7) **Ensure that no contractor employees,** employees of subcontractors or suppliers, or other persons enter any part of the air operations area (AOA) from the construction site unless authorized.

(8) **Ensure prompt submittal through the airport operator of Form 7460-1** for the purpose of conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, other equipment), stock piles, and haul routes when different from cases previously filed by the airport operator. The FAA encourages online submittal of forms for expediency.

d. **Define Tenant's Responsibilities** if planning construction activities on leased property. Airport tenants, such as airline operators, fixed base operators, and FAA ATO/Technical Operations sponsoring construction must:

(1) **Develop, or have a consultant develop, a project specific CSPP** and submit it to the airport operator for certification and subsequent approval by the FAA. The approved CSPP must be made part of any contract awarded by the tenant for construction work

(2) **In coordination with its contractor, develop an SPCD** and submit it to the airport operator for approval to be issued prior to issuance of a Notice to Proceed

(3) **Ensure that construction personnel are familiar with safety procedures** and regulations on the airport.

(4) **Provide a point of contact** of who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport.

(5) **Identify in the SPCD the contractor's on-site employees** responsible for monitoring compliance with the CSPP and SPCD during construction At least one of these employees must be on-site whenever active construction is taking place.

(6) **Ensure that no tenant or contractor employees,** employees of subcontractors or suppliers, or any other persons enter any part of the AOA from the construction site unless authorized.

(7) **Restrict movement of construction vehicles** to construction areas by flagging and barricading, erecting temporary fencing, or providing escorts, as appropriate, and as specified in the CSPP and SPCD.

(8) **Ensure prompt submittal through the airport operator of Form 7460-1** for the purpose of conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, other.), stock piles, and haul routes. The FAA encourages online submittal of forms for expediency

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Chapter 2. Construction Safety and Phasing Plans

Section 1. Basic Considerations

201. Overview. Aviation safety is the primary consideration at airports, especially during construction. The airport operator's Construction Safety and Phasing Plan (CSPP) and the contractor's Safety Plan Compliance Document (SPCD) are the primary tools to ensure safety compliance when coordinating construction activities with airport operations. These documents identify all aspects of the construction project that pose a potential safety hazard to airport operations and outline respective mitigation procedures for each hazard. They must provide all information necessary for the Airport Operations department to conduct airfield inspections and expeditiously identify and correct unsafe conditions during construction. All aviation safety provisions included within the project drawings, contract specifications, and other related documents must also be reflected in the CSPP and SPCD

202. Assume Responsibility. Operational safety on the airport remains the airport operator's responsibility at all times. The airport operator must develop, certify, and submit for FAA approval each CSPP. It is the airport operator's responsibility to apply the requirements of the FAA approved CSPP. The airport operator must revise the CSPP when conditions warrant changes and must submit the revised CSPP to the FAA for approval. The airport operator must also require and approve a SPCD from the project contractor.

203. Submit the CSPP. Construction Safety and Phasing Plans should be developed concurrently with the project design. Milestone versions of the CSPP should be submitted for review and approval as follows. While these milestones are not mandatory, early submission will help to avoid delays. Submittals are preferred in 8 5 x 11 in or 11 x 17 in format for compatibility with the FAA's Obstruction Evaluation / Airport Airspace Analysis (OE / AAA) process.

a. Submit an Outline/Draft. By the time approximately 25% to 30% of the project design is completed, the principal elements of the CSPP should be established Airport operators are encouraged to submit an outline or draft, detailing all CSPP provisions developed to date, to the FAA for review at this stage of the project design

b. Submit a Construction Safety and Phasing Plan (CSPP). The CSPP should be formally submitted for FAA approval when the project design is 80% to 90% complete. Since provisions in the CSPP will influence contract costs, it is important to obtain FAA approval in time to include all such provisions in the procurement contract.

c. Submit a Safety Plan Compliance Document (SPCD). The contractor should submit the SPCD to the airport operator for approval to be issued prior to the Notice to Proceed

d. Submit CSPP Revisions. All revisions to the CSPP or SPCD should be submitted to the FAA for approval as soon as required changes are identified.

204. Meet CSPP Requirements.

a. To the extent possible, the CSPP should address the following as outlined in Section 2, Plan Requirements and Chapter 3, Guidelines for Writing a CSPP, as appropriate. Details that cannot be determined at this stage are to be included in the SPCD

(1) Coordination.

(a) Contractor progress meetings.

(b) Scope or schedule changes

(c) FAA ATO coordination.

(2) Phasing.

(a) Phase elements

(b) Construction safety drawings

(3) Areas and operations affected by the construction activity.

(a) Identification of affected areas.

(b) Mitigation of effects

(4) Protection of navigation aids (NAVAIDs).

(5) Contractor access.

(a) Location of stockpiled construction materials.

(b) Vehicle and pedestrian operations.

(6) Wildlife management.

(a) Trash.

(b) Standing water.

(c) Tall grass and seeds.

(d) Poorly maintained fencing and gates.

(e) Disruption of existing wildlife habitat

(7) Foreign Object Debris (FOD) management.

(8) Hazardous materials (HAZMAT) management

(9) Notification of construction activities.

(a) Maintenance of a list of responsible representatives/ points of contact.

(b) Notices to Airmen (NOTAM)

(c) Emergency notification procedures.

(d) Coordination with ARFF Personnel.

(e) Notification to the FAA.

(10) Inspection requirements.

(a) Daily (or more frequent) inspections.

(b) Final inspections.

(11) Underground utilities.

(12) Penalties.

(13) Special conditions.

(14) Runway and taxiway visual aids. Marking, lighting, signs, and visual NAVAIDs.

(a) General.

(b) Markings.

(c) Lighting and visual NAVAIDs.

(d) Signs.

(15) Marking and signs for access routes.

(16) Hazard marking and lighting.

(a) Purpose.

(b) Equipment

(17) Protection. Of runway and taxiway safety areas, object free areas, obstacle free zones, and approach/departure surfaces

(a) Runway Safety Area (RSA)

(b) Runway Object Free Area (ROFA).

(c) Taxiway Safety Area (TSA).

(d) Taxiway Object Free Area (TOFA).

(e) Obstacle Free Zone (OFZ).

(f) Runway approach/departure surfaces

(18) Other limitations on construction.

(a) Prohibitions.

(b) Restrictions

b. The Safety Plan Compliance Document (SPCD) should include a general statement by the construction contractor that he/she has read and will abide by the CSPP. In addition, the SPCD must include all supplemental information that could not be included in the CSPP prior to the contract award The contractor statement should include the name of the contractor, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I , Name of Contractor , have read the Title of Project CSPP, approved on Date , and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not duplicate information in the CSPP:

(1) Coordination. Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors

(2) Phasing. Discuss proposed construction schedule elements, including·

(a) Duration of each phase.

(b) Daily start and finish of construction, including "night only" construction.

(c) Duration of construction activities during:

(i) Normal runway operations

(ii) Closed runway operations.

(iii) Modified runway "Aircraft Reference Code" usage.

(3) Areas and operations affected by the construction activity. These areas and operations should be identified in the CSPP and should not require an entry in the SPCD.

(4) Protection of NAVAIDs. Discuss specific methods proposed to protect operating NAVAIDs

(5) Contractor access. Provide the following:

(a) Details on how the contractor will maintain the integrity of the airport security fence (gate guards, daily log of construction personnel, and other).

(b) Listing of individuals requiring driver training (for certificated airports and as requested)

(c) Radio communications.

(i) Types of radios and backup capabilities

(ii) Who will be monitoring radios

(iii) Whom to contact if the ATCT cannot reach the contractor's designated person by radio.

(d) Details on how the contractor will escort material delivery vehicles

(6) Wildlife management. Discuss the following

(a) Methods and procedures to prevent wildlife attraction

(b) Wildlife reporting procedures

(7) Foreign Object Debris (FOD) management. Discuss equipment and methods for control of FOD, including construction debris and dust.

(8) Hazardous material (HAZMAT) management. Discuss equipment and methods for responding to hazardous spills.

(9) Notification of construction activities. Provide the following

(a) Contractor points of contact.

(b) Contractor emergency contact.

(c) Listing of tall or other requested equipment proposed for use on the airport and the timeframe for submitting 7460-1 forms not previously submitted by the airport operator.

(d) Batch plant details, including 7460-1 submittal.

(10) Inspection requirements. Discuss daily (or more frequent) inspections and special inspection procedures

(11) Underground utilities. Discuss proposed methods of identifying and protecting underground utilities.

(12) Penalties. Penalties should be identified in the CSPP and should not require an entry in the SPCD

(13) Special conditions. Discuss proposed actions for each special condition identified in the CSPP.

(14) Runway and taxiway visual aids. Including marking, lighting, signs, and visual NAVAIDs. Discuss proposed visual aids including the following.

(a) Equipment and methods for covering signage and airfield lights.

(b) Equipment and methods for temporary closure markings (paint, fabric, other).

(c) Types of temporary Visual Guidance Slope Indicators (VGSI).

(15) Marking and signs for access routes. Discuss proposed methods of demarcating access routes for vehicle drivers.

(16) Hazard marking and lighting. Discuss proposed equipment and methods for identifying excavation areas.

(17) Protection of runway and taxiway safety areas. including object free areas, obstacle free zones, and approach/departure surfaces Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including.

(a) Equipment and methods for maintaining Taxiway Safety Area standards

(b) Equipment and methods for separation of construction operations from aircraft operations, including details of barricades

(18) Other limitations on construction should be identified in the CSPP and should not require an entry in the SPCD

Section 2. Plan Requirements

205. Coordination. Airport operators, or tenants conducting construction on their leased properties, should use predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction (see AC 150/5300-9) In addition, the following should be coordinated as required:

a. Contractor Progress Meetings. Operational safety should be a standing agenda item for discussion during progress meetings throughout the project.

b. Scope or Schedule Changes. Changes in the scope or duration of the project may necessitate revisions to the CSPP and review and approval by the airport operator and the FAA

c. FAA ATO Coordination. Early coordination with FAA ATO is required to schedule airway facility shutdowns and restarts Relocation or adjustments to NAVAIDs, or changes to final grades in critical areas, may require an FAA flight inspection prior to restarting the facility. Flight inspections must be coordinated and scheduled well in advance of the intended facility restart. Flight inspections may require a reimbursable agreement between the airport operator and FAA ATO. Reimbursable agreements should be coordinated a minimum of 12 months prior to the start of construction. (See 213 e(3)(b) for required FAA notification regarding FAA owned NAVAIDs.)

206. Phasing. Once it has been determined what types and levels of airport operations will be maintained, the most efficient sequence of construction may not be feasible. In such a case, the sequence of construction may be phased to gain maximum efficiency while allowing for the required operations The development of the resulting construction phases should be coordinated with local Air Traffic personnel and airport users. The sequenced construction phases established in the CSPP must be incorporated into the project design and must be reflected in the contract drawings and specifications.

a. Phase Elements. For each phase the CSPP should detail:

- Areas closed to aircraft operations

- Duration of closures
- Taxi routes
- ARFF access routes
- Construction staging areas
- Construction access and haul routes
- Impacts to NAVAIDs
- Lighting and marking changes
- Available runway length
- Declared distances (if applicable)
- Required hazard marking and lighting
- Lead times for required notifications

b. Construction Safety Drawings. Drawings specifically indicating operational safety procedures and methods in affected areas (that is, construction safety drawings) should be developed for each construction phase Such drawings should be included in the CSPP as referenced attachments and should likewise be included in the contract drawing package.

207. Areas and Operations Affected by Construction Activity. Runways and taxiways should remain in use by aircraft to the maximum extent possible without compromising safety Pre-meetings with the FAA Air Traffic Organization (ATO) will support operational simulations. See Chapter 3 for an example of a table showing temporary operations versus current operations.

a. Identification of Affected Areas. Identifying areas and operations affected by the construction will help to determine possible safety problems The affected areas should be indentified in the construction safety drawings for each construction phase (See 206 b above.) Of particular concern are·

(1) Closing, or partial closing, of runways, taxiways and aprons. When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing, landing, or taking off in either direction on that pavement is prohibited. A displaced threshold, by contrast, is established to ensure obstacle clearance and adequate safety area for landing aircraft The pavement prior to the displaced threshold is available for take-off in the direction of the displacement and for landing and taking off in the opposite direction. Misunderstanding this difference, and issuance of a subsequently inaccurate NOTAM, can lead to a hazardous condition.

(2) Closing of Aircraft Rescue and Fire Fighting access routes.

(3) Closing of access routes used by airport and airline support vehicles.

(4) Interruption of utilities, including water supplies for fire fighting.

(5) Approach/departure surfaces affected by heights of objects.

(6) Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads.

b. Mitigation of Effects. Establishment of specific procedures is necessary to maintain the safety and efficiency of airport operations The CSPP must address:

(1) Temporary changes to runway and/or taxi operations.

(2) Detours for ARFF and other airport vehicles.

(3) Maintenance of essential utilities.

(4) Temporary changes to air traffic control procedures. Such changes must be coordinated with the ATO.

208. Navigation Aid (NAVAID) Protection. Before commencing construction activity, parking vehicles, or storing construction equipment and materials near a NAVAID, coordinate with the appropriate FAA ATO/Technical Operations office to evaluate the effect of construction activity and the required distance and direction from the NAVAID. (See paragraph 213 e(3) below.) Construction activities, materials/equipment storage, and vehicle parking near electronic NAVAIDs require special consideration since they may interfere with signals essential to air navigation. If any NAVAID may be affected, the CSPP and SPCD must show an understanding of the "critical area" associated with each NAVAID and describe how it will be protected. Where applicable, the operational critical areas of NAVAIDs should be graphically delineated on the project drawings Pay particular attention to stockpiling material, as well as to movement and parking of equipment that may interfere with line of sight from the ATCT or with electronic emissions Interference from construction equipment and activities may require NAVAID shutdown or adjustment of instrument approach minimums for low visibility operations. This condition requires that a NOTAM be filed (see paragraph 213.b below). Construction activities and materials/equipment storage near a NAVAID must not obstruct access to the equipment and instruments for maintenance. Submittal of a 7460-1 form is required for construction vehicles operating near FAA NAVAIDs. (See paragraph 213.e(1) below.)

209. Contractor Access. The CSPP must detail the areas to which the contractor must have access, and explain how contractor personnel will access those areas. Specifically address:

a. Location of Stockpiled Construction Materials. Stockpiled materials and equipment storage are not permitted within the RSA and OFZ, and if possible should not be permitted within the Object Free Area (OFA) of an operational runway. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval. The airport operator must ensure that stockpiled materials and equipment adjacent to these areas are prominently marked and lighted during hours of restricted visibility or darkness. (See paragraph 218.b below.) This includes determining and verifying that materials are stabilized and stored at an approved location so as not to be a hazard to aircraft operations and to prevent attraction of wildlife and foreign object damage. See paragraphs 210 and 211 below.

b. Vehicle and Pedestrian Operations. The CSPP should include specific vehicle and pedestrian requirements. Vehicle and pedestrian access routes for airport construction projects must be controlled to prevent inadvertent or unauthorized entry of persons, vehicles, or animals onto the AOA. The airport operator should coordinate requirements for vehicle operations with airport tenants, contractors, and the FAA air traffic manager. In regard to vehicle and pedestrian operations, the CSPP should include the following, and detail associated training requirements:

(1) Construction site parking. Designate in advance vehicle parking areas for contractor employees to prevent any unauthorized entry of persons or vehicles onto the AOA. These areas should provide reasonable contractor employee access to the job site.

(2) Construction equipment parking. Contractor employees must park and service all construction vehicles in an area designated by the airport operator outside the OFZ and never in the safety area of an active runway or taxiway. Unless a complex setup procedure makes movement of specialized equipment infeasible, inactive equipment must not be parked on a closed taxiway or runway. If it is necessary to leave specialized equipment on a closed taxiway or runway at night, the equipment must be well lighted. Employees should also park construction vehicles outside the OFA when not in use by

construction personnel (for example, overnight, on weekends, or during other periods when construction is not active) Parking areas must not obstruct the clear line of sight by the ATCT to any taxiways or runways under air traffic control nor obstruct any runway visual aids, signs, or navigation aids. The FAA must also study those areas to determine effects on airport design criteria, surfaces established by 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (Part 77), and on NAVAIDs and Instrument Approach Procedures (IAP). See paragraph 213.e(1) below for further information.

(3) Access and haul roads. Determine the construction contractor's access to the construction sites and haul roads. Do not permit the construction contractor to use any access or haul roads other than those approved Access routes used by contractor vehicles must be clearly marked to prevent inadvertent entry to areas open to airport operations. Pay special attention to ensure that if construction traffic is to share or cross any ARFF routes that ARFF right of way is not impeded at any time, and that construction traffic on haul roads does not interfere with NAVAIDs or approach surfaces of operational runways

(4) Marking and lighting of vehicles in accordance with AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport.

(5) Description of proper vehicle operations on various areas under normal, lost communications, and emergency conditions.

(6) Required escorts.

(7) Training requirements for vehicle drivers to ensure compliance with the airport operator's vehicle rules and regulations. Specific training should be provided to those vehicle operators providing escorts. See AC 150/5210-20, Ground Vehicle Operations on Airports, for information on training and records maintenance requirements.

(8) Situational awareness. Vehicle drivers must confirm by personal observation that no aircraft is approaching their position (either in the air or on the ground) when given clearance to cross a runway, taxiway, or any other area open to airport operations. In addition, it is the responsibility of the escort vehicle driver to verify the movement/position of all escorted vehicles at any given time

(9) Two-way radio communication procedures.

(a) General. The airport operator must ensure that tenant and construction contractor personnel engaged in activities involving unescorted operation on aircraft movement areas observe the proper procedures for communications, including using appropriate radio frequencies at airports with and without ATCT When operating vehicles on or near open runways or taxiways, construction personnel must understand the critical importance of maintaining radio contact, as directed by the airport operator, with:

(i) Airport operations

(ii) ATCT

(iii) Common Traffic Advisory Frequency (CTAF), which may include UNICOM, MULTICOM.

(iv) Automatic Terminal Information Service (ATIS). This frequency is useful for monitoring conditions on the airport. Local air traffic will broadcast information regarding construction related runway closures and "shortened" runways on the ATIS frequency.

(b) Areas requiring two-way radio communication with the ATCT. Vehicular traffic crossing active movement areas must be controlled either by two-way radio with the ATCT, escort, flagman, signal light, or other means appropriate for the particular airport

(c) Frequencies to be used. The airport operator will specify the frequencies to be used by the contractor, which may include the CTAF for monitoring of aircraft operations. Frequencies may also be assigned by the airport operator for other communications, including any radio frequency in compliance with Federal Communications Commission requirements At airports with an ATCT, the airport operator will specify the frequency assigned by the ATCT to be used between contractor vehicles and the ATCT.

(d) Proper radio usage, including read back requirements.

(e) Proper phraseology, including the International Phonetic Alphabet.

(f) Light gun signals Even though radio communication is maintained, escort vehicle drivers must also familiarize themselves with ATCT light gun signals in the event of radio failure See the FAA safety placard "Ground Vehicle Guide to Airport Signs and Markings." This safety placard may be downloaded through the Runway Safety Program Web site at http //www faa gov/airports/ runway_safety/publications/ (See "Signs & Markings Vehicle Dashboard Sticker") or obtained from the FAA Airports Regional Office.

(10) Maintenance of the secured area of the airport, including:

(a) Fencing and gates. Airport operators and contractors must take care to maintain security during construction when access points are created in the security fencing to permit the passage of construction vehicles or personnel. Temporary gates should be equipped so they can be securely closed and locked to prevent access by animals and unauthorized people Procedures should be in place to ensure that only authorized persons and vehicles have access to the AOA and to prohibit "piggybacking" behind another person or vehicle. The Department of Transportation (DOT) document DOT/FAA/AR-00/52, Recommended Security Guidelines for Airport Planning and Construction, provides more specific information on fencing. A copy of this document can be obtained from the Airport Consultants Council, Airports Council International, or American Association of Airport Executives

(b) Badging requirements.

(c) Airports subject to 49 CFR Part 1542, Airport Security, must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel

210. Wildlife Management. The CSPP and SPCD must be in accordance with the airport operator's wildlife hazard management plan, if applicable. See also AC 150/5200-33, Hazardous Wildlife Attractants On or Near Airports, and Certalert 98-05, Grasses Attractive to Hazardous Wildlife. Construction contractors must carefully control and continuously remove waste or loose materials that might attract wildlife. Contractor personnel must be aware of and avoid construction activities that can create wildlife hazards on airports, such as·

a. Trash. Food scraps must be collected from construction personnel activity

b. Standing Water.

c. Tall Grass and Seeds. Requirements for turf establishment can be at odds with requirements for wildlife control. Grass seed is attractive to birds. Lower quality seed mixtures can contain seeds of plants (such as clover) that attract larger wildlife Seeding should comply with the guidance in AC 150/5370-10, Standards for Specifying Construction of Airports, Item T-901, Seeding. Contact the local office of the United Sates Department of Agriculture Soil Conservation Service or the State University Agricultural Extension Service (County Agent or equivalent) for assistance and recommendations. These agencies can also provide liming and fertilizer recommendations.

d. Poorly Maintained Fencing and Gates. See 209 b(10)(a) above.

e. Disruption of Existing Wildlife Habitat. While this will frequently be unavoidable due to the nature of the project, the CSPP should specify under what circumstances (location, wildlife type) contractor personnel should immediately notify the airport operator of wildlife sightings.

211. Foreign Object Debris (FOD) Management. Waste and loose materials, commonly referred to as FOD, are capable of causing damage to aircraft landing gears, propellers, and jet engines. Construction contractors must not leave or place FOD on or near active aircraft movement areas. Materials capable of creating FOD must be continuously removed during the construction project. Fencing (other than security fencing) may be necessary to contain material that can be carried by wind into areas where aircraft operate. See AC 150/5210-24, Foreign Object Debris (FOD) Management

212. Hazardous Materials (HAZMAT) Management. Contractors operating construction vehicles and equipment on the airport must be prepared to expeditiously contain and clean-up spills resulting from fuel or hydraulic fluid leaks. Transport and handling of other hazardous materials on an airport also requires special procedures. See AC 150/5320-15, Management of Airport Industrial Waste

213. Notification of Construction Activities. The CSPP and SPCD must detail procedures for the immediate notification of airport users and the FAA of any conditions adversely affecting the operational safety of the airport. It must address the notification actions described below, as applicable.

a. List of Responsible Representatives/ points of contact for all involved parties, and procedures for contacting each of them, including after hours

b. NOTAMs. Only the airport operator may initiate or cancel NOTAMs on airport conditions, and is the only entity that can close or open a runway The airport operator must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities with tenants and the local air traffic facility (control tower, approach control, or air traffic control center), and must provide information on closed or hazardous conditions on airport movement areas to the FAA Flight Service Station (FSS) so it can issue a NOTAM The airport operator must file and maintain a list of authorized representatives with the FSS Refer to AC 150/5200-28, Notices to Airmen (NOTAMs) for Airport Operators, for a sample NOTAM form. Only the FAA may issue or cancel NOTAMs on shutdown or irregular operation of FAA owned facilities Any person having reason to believe that a NOTAM is missing, incomplete, or inaccurate must notify the airport operator See paragraph 207.a(1) above regarding issuing NOTAMs for partially closed runways versus runways with displaced thresholds.

c. Emergency notification procedures for medical, fire fighting, and police response.

d. Coordination with ARFF. The CSPP must detail procedures for coordinating through the airport sponsor with ARFF personnel, mutual aid providers, and other emergency services if construction requires:

- The deactivation and subsequent reactivation of water lines or fire hydrants, or
- The rerouting, blocking and restoration of emergency access routes, or
- The use of hazardous materials on the airfield.

e. Notification to the FAA.

(1) Part 77. Any person proposing construction or alteration of objects that affect navigable airspace, as defined in Part 77, must notify the FAA. This includes construction equipment and proposed

parking areas for this equipment (i e. cranes, graders, other equipment) on airports. FAA Form 7460-1, Notice of Proposed Construction or Alteration, can be used for this purpose and submitted to the appropriate FAA Airports Regional or District Office. See Appendix 1, Related Reading Material, to download the form. Further guidance is available on the FAA web site at oeaaa faa gov

(2) Part 157. With some exceptions, Title 14 CFR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports, requires that the airport operator notify the FAA in writing whenever a non-Federally funded project involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway, or the deactivation or abandoning of an entire airport. Notification involves submitting FAA Form 7480-1, Notice of Landing Area Proposal, to the nearest FAA Airports Regional or District Office See Appendix 1, Related Reading Material to download the form.

(3) NAVAIDS. For emergency (short-notice) notification about impacts to both airport owned and FAA owned NAVAIDs, contact 866-432-2622.

(a) Airport owned/FAA maintained. If construction operations require a shutdown of more than 24 hours, or more than 4 hours daily on consecutive days, of a NAVAID owned by the airport but maintained by the FAA, provide a 45-day minimum notice to FAA ATO/Technical Operations prior to facility shutdown

(b) FAA owned.

(i) General The airport operator must notify the appropriate FAA ATO Service Area Planning and Requirements (P&R) Group a minimum of 45 days prior to implementing an event that causes impacts to NAVAIDs (Impacts to FAA equipment covered by a Reimbursable Agreement (RA) do not have to be reported by the airport operator.)

(ii) Coordinate work for an FAA owned NAVAID shutdown with the local FAA ATO/Technical Operations office, including any necessary reimbursable agreements and flight checks. Detail procedures that address unanticipated utility outages and cable cuts that could impact FAA NAVAIDs. In addition, provide seven days notice to schedule the actual shutdown.

214. Inspection Requirements.

a. Daily Inspections. Inspections should be conducted at least daily, but more frequently if necessary to ensure conformance with the CSPP. A sample checklist is provided in Appendix 3, Safety and Phasing Plan Checklist. See also AC 150/5200-18, Airport Safety Self-Inspection.

b. Final Inspections. New runways and extended runway closures may require safety inspections at certificated airports prior to allowing air carrier service. Coordinate with the FAA Airport Certification Safety Inspector (ACSI) to determine if a final inspection will be necessary

215. Underground Utilities. The CSPP and/or SPCD must include procedures for locating and protecting existing underground utilities, cables, wires, pipelines, and other underground facilities in excavation areas. This may involve coordinating with public utilities and FAA ATO/Technical Operations. Note that "One Call" or "Miss Utility" services do not include FAA ATO/Technical Operations

216. Penalties. The CSPP should detail penalty provisions for noncompliance with airport rules and regulations and the safety plans (for example, if a vehicle is involved in a runway incursion) Such penalties typically include rescission of driving privileges or access to the AOA.

217. Special Conditions. The CSPP must detail any special conditions that affect the operation of the

airport and will require the activation of any special procedures (for example, low-visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, Vehicle / Pedestrian Deviation (VPD) and other activities requiring construction suspension/resumption).

218. Runway and Taxiway Visual Aids. Includes marking, lighting, signs, and visual NAVAIDS. The CSPP must ensure that areas where aircraft will be operating are clearly and visibly separated from construction areas, including closed runways. Throughout the duration of the construction project, verify that these areas remain clearly marked and visible at all times and that marking, lighting, signs, and visual NAVAIDs remain in place and operational The CSPP must address the following, as appropriate.

a. General. Airport markings, lighting, signs, and visual NAVAIDs must be clearly visible to pilots, not misleading, confusing, or deceptive. All must be secured in place to prevent movement by prop wash, jet blast, wing vortices, or other wind currents and constructed of materials that would minimize damage to an aircraft in the event of inadvertent contact

b. Markings. Markings must be in compliance with the standards of AC 150/5340-1, Standards for Airport Markings. Runways and runway exit taxiways closed to aircraft operations are marked with a yellow X The preferred visual aid to depict temporary runway closure is the lighted X signal placed on or near the runway designation numbers. (See paragraph 218.b(1)(b) below.)

(1) Closed Runways and Taxiways.

(a) Permanently Closed Runways For runways, obliterate the threshold marking, runway designation marking, and touchdown zone markings, and place Xs at each end and at 1,000-foot (300 m) intervals.

(b) Temporarily Closed Runways. For runways that have been temporarily closed, place an X at the each end of the runway directly on or as near as practicable to the runway designation numbers Figure 2-1 illustrates.

Figure 2-1 Markings for a Temporarily Closed Runway

(c) Partially Closed Runways and Displaced Thresholds. When threshold markings are needed to identify the temporary beginning of the runway that is available for landing, the markings must comply with AC 150/5340-1 An X is not used on a partially closed runway or a runway with a displaced threshold. See paragraph 207 a(1) above for the difference between partially closed runways and runways with displaced thresholds

(i) Partially Closed Runways Pavement markings for temporary closed portions of the runway consist of a runway threshold bar and yellow chevrons to identify pavement areas that are unsuitable for takeoff or landing (see AC 150/5340-1).

(ii) Displaced Thresholds Pavement markings for a displaced threshold consist of a runway threshold bar and white arrowheads with and without arrow shafts. These markings 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. See AC 150/5340-1.

(d) Taxiways.

(i) Permanently Closed Taxiways. AC 150/5300-13 notes that it is preferable to remove the pavement, but for pavement that is to remain, place an X at the entrance to both ends of the closed section. Obliterate taxiway centerline markings, including runway leadoff lines, leading to the closed taxiway. Figure 2-2 illustrates.

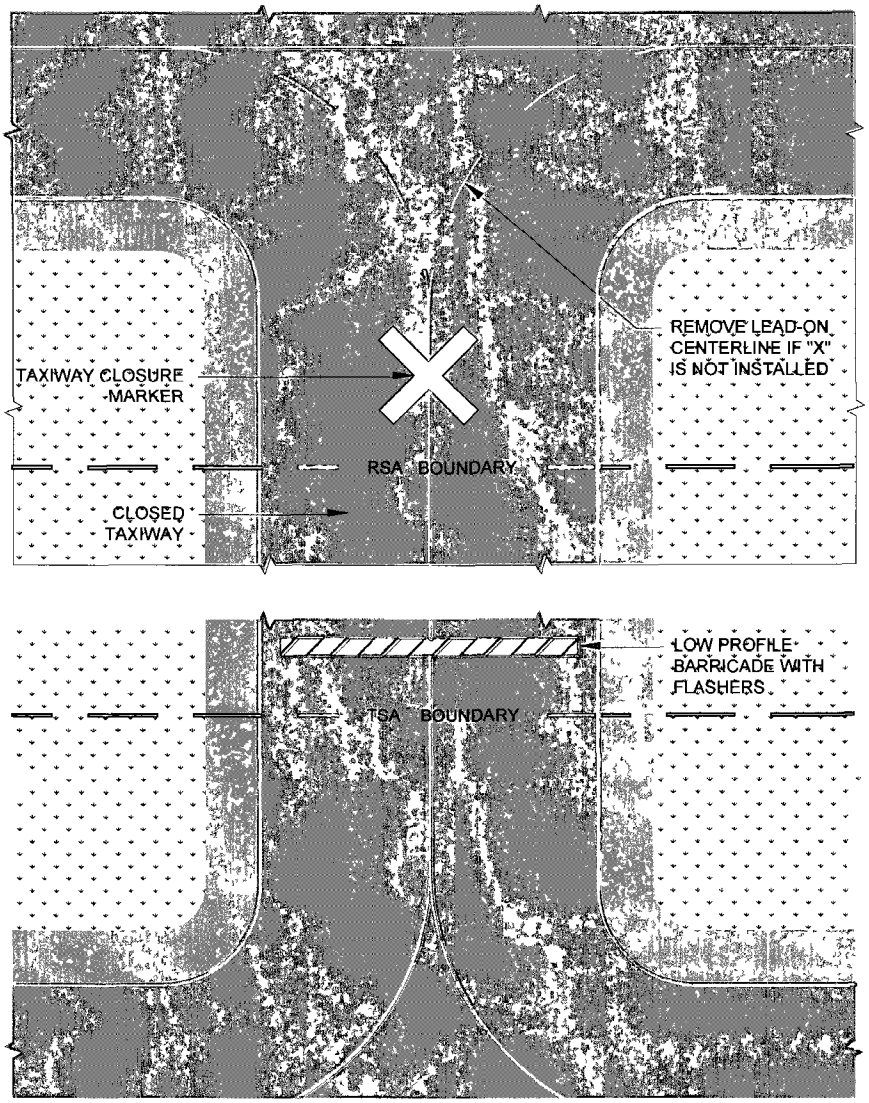

Figure 2-2 Taxiway Closure

(ii) Temporarily Closed Taxiways Place barricades outside the safety area of intersecting taxiways. For runway/taxiway intersections, place an X at the entrance to the closed taxiway from the runway. If the taxiway will be closed for an extended period, obliterate taxiway centerline markings, including runway leadoff lines, leading to the closed section If the centerline markings will be reused upon reopening the taxiway, it is preferable to paint over the marking. This will result in less damage to the pavement when the upper layer of paint is ultimately removed.

(e) Temporarily Closed Airport. When the airport is closed temporarily, mark all the runways as closed.

(i) If unable to paint temporary markings on the pavement, construct them from any of the following materials: fabric, colored plastic, painted sheets of plywood, or similar materials. They must be properly configured and appropriately secured to prevent movement by prop wash, jet blast, or other wind currents.

(ii) It may be necessary to remove or cover runway markings, including but not limited to, runway designation markings, threshold markings, centerline markings, edge stripes, touchdown zone markings and aiming point markings, depending on the length of construction and type of activity at the airport. When removing runway markings, apply the same treatment to areas between stripes or numbers, as the cleaned area will appear to pilots as a marking in the shape of the treated area.

(iii) If it is not possible to install threshold bars, chevrons, and arrows on the pavement, temporary outboard markings may be used. Locate them outside of the runway pavement surface on both sides of the runway. The dimension along the runway direction must be the same as if installed on the pavement. The lateral dimension must be at least one-half that of on-pavement markings. If the markings are not discernable on grass or snow, apply a black background with appropriate material over the ground to ensure they are clearly visible.

(iv) The application rate of paint to mark a short-term temporary runway and taxiway markings may deviate from the standard (see Item P-620, "Runway and Taxiway Painting," in AC 150/5370-10), but the dimensions must meet the existing standards.

(f) Lighting and Visual NAVAIDs This paragraph refers to standard runway and taxiway lighting systems. See below for hazard lighting. Lighting must be in conformance with AC 150/5340-30, Design and Installation Details for Airport Visual Aids, and AC 150/5345-50, Specification for Portable Runway and Taxiway Lights. When disconnecting runway and taxiway lighting fixtures, disconnect the associated isolation transformers. Alternately, cover the light fixture in such a way as to prevent light leakage. Avoid removing the lamp from energized fixtures because an excessive number of isolation transformers with open secondaries may damage the regulators and/or increase the current above its normal value. Secure, identify, and place any above ground temporary wiring in conduit to prevent electrocution and fire ignition sources.

(2) Permanently Closed Runways and Taxiways. For runways and taxiways that have been permanently closed, disconnect the lighting circuits.

(3) Temporarily Closed Runways. If available, use a lighted X, both at night and during the day, placed at each end of the runway facing the approach. The use of a lighted X is required if night work requires runway lighting to be on See AC 150/5345-55, Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure. For runways that have been temporarily closed, but for an extended period, and for those with pilot controlled lighting, disconnect the lighting circuits or secure switches to prevent inadvertent activation For runways that will be opened periodically, coordinate procedures with the FAA air traffic manager or, at airports without an ATCT, the airport operator. Activate stop bars if available. Figure 2-3 shows a lighted X by day. Figure 2-4 shows a lighted X at night

Figure 2-3 Lighted X in Daytime

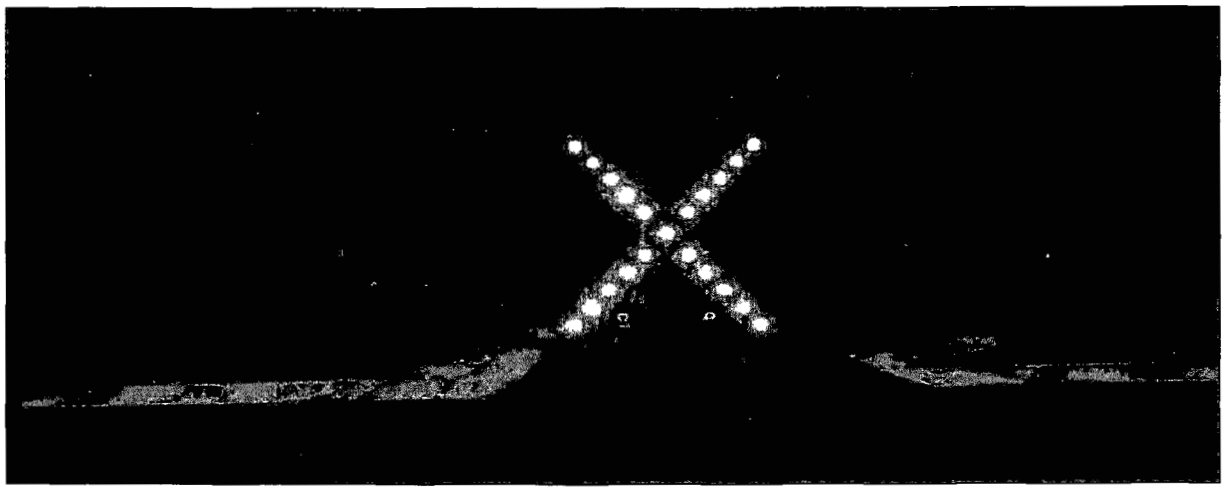

Figure 2-4 Lighted X at Night

(4) Partially Closed Runways and Displaced Thresholds. When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing and landing or

taking off in either direction. A displaced threshold, by contrast, is put in place to ensure obstacle clearance by landing aircraft. The pavement prior to the displaced threshold is available for takeoff in the direction of the displacement, and for landing and takeoff in the opposite direction Misunderstanding this difference and issuance of a subsequently inaccurate NOTAM can result in a hazardous situation. For both partially closed runways and displaced thresholds, approach lighting systems at the affected end must be placed out of service

(a) Partially Closed Runways. Disconnect edge and threshold lights on that part of the runway at and behind the threshold (that is, the portion of the runway that is closed). Alternately, cover the light fixture in such a way as to prevent light leakage

(b) Displaced Thresholds Edge lighting in the area of the displacement emits red light in the direction of approach and yellow light in the opposite direction. Centerline lights are blanked out in the direction of approach if the displacement is 700 ft or less. If the displacement is over 700 ft, place the centerline lights out of service. See AC 150/5340-30 for details on lighting displaced thresholds.

(c) Temporary runway thresholds and runway ends must be lighted if the runway is lighted and it is the intended threshold for night landings or instrument meteorological conditions.

(d) A temporary threshold on an unlighted runway may be marked by retroreflective, elevated markers in addition to markings noted in paragraph 218 b(1)(c) above. Markers seen by aircraft on approach are green Markers at the rollout end of the runway are red At certificated airports, temporary elevated threshold markers must be mounted with a frangible fitting (see 14 CFR Part 139.309). At non-certificated airports, the temporary elevated threshold markings may either be mounted with a frangible fitting or be flexible. See AC 150/5345-39, Specification for L-853, Runway and Taxiway Retroreflective Markers.

(e) Temporary threshold lights and end lights and related visual NAVAIDs are installed outboard of the edges of the full-strength pavement only when they cannot be installed on the pavement. They are installed with bases at grade level or as low as possible, but not more than 3 in (7 6 cm) above ground When any portion of a base is above grade, place properly compacted fill around the base to minimize the rate of gradient change so aircraft can, in an emergency, cross at normal landing or takeoff speeds without incurring significant damage. See AC 150/5370-10

(f) Maintain threshold and edge lighting color and spacing standards as described in AC 150/5340-30. Battery powered, solar, or portable lights that meet the criteria in AC 150/5345-50 may be used. These systems are intended primarily for visual flight rules (VFR) aircraft operations but may be used for instrument flight rules (IFR) aircraft operations, upon individual approval from the Flight Standards Division of the applicable FAA Regional Office.

(g) Reconfigure yellow lenses (caution zone), as necessary. If the runway has centerline lights, reconfigure the red lenses, as necessary, or place the centerline lights out of service

(h) Relocate the visual glide slope indicator (VGSI), such as VASI and PAPI; other airport lights, such as Runway End Identifier Lights (REIL); and approach lights to identify the temporary threshold. Another option is to disable the VGSI or any equipment that would give misleading indications to pilots as to the new threshold location Installation of temporary visual aids may be necessary to provide adequate guidance to pilots on approach to the affected runway. If the FAA owns and operates the VGSI, coordinate its installation or disabling with the local ATO/Technical Operations Office. Relocation of such visual aids will depend on the duration of the project and the benefits gained from the relocation, as this can result in great expense

(i) Issue a NOTAM to inform pilots of temporary lighting conditions.

(5) Temporarily Closed Taxiways. If possible, deactivate the taxiway lighting circuits. When deactivation is not possible (for example other taxiways on the same circuit are to remain open),

cover the light fixture in such a way as to prevent light leakage.

c. Signs. To the extent possible, signs must be in conformance with AC 150/5345-44, Specification for Runway and Taxiway Signs and AC 150/5340-18, Standard for Airport Sign Systems. Any time a sign does not serve its normal function; it must be covered or removed to prevent misdirecting pilots. Note that information signs identifying a crossing taxiway continue to perform their normal function even if the crossing taxiway is closed. For long term construction projects, consider relocating signs, especially runway distance remaining signs.

219. Marking and Signs for Access Routes. The CSPP should indicate that pavement markings and signs for construction personnel will conform to AC 150/5340-18 and, to the extent practicable, with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or State highway specifications. Signs adjacent to areas used by aircraft must comply with the frangibility requirements of AC 150/5220-23, Frangible Connections, which may require modification to size and height guidance in the MUTCD.

220. Hazard Marking, Lighting and Signing.

a. Hazard Marking and Lighting Prevents Pilots from entering areas closed to aircraft, and prevents construction personnel from entering areas open to aircraft. The CSPP must specify prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles. Hazard marking and lighting must also be specified to identify open manholes, small areas under repair, stockpiled material, waste areas, and areas subject to jet blast. Also consider less obvious construction-related hazards and include markings to identify FAA, airport, and National Weather Service facilities cables and power lines; instrument landing system (ILS) critical areas; airport surfaces, such as RSA, OFA, and OFZ; and other sensitive areas to make it easier for contractor personnel to avoid these areas.

b. Equipment.

(1) Barricades, including traffic cones, (weighted or sturdily attached to the surface) are acceptable methods used to identify and define the limits of construction and hazardous areas on airports. Careful consideration must be given to selecting equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast. The spacing of barricades must be such that a breach is physically prevented barring a deliberate act For example, if barricades are intended to exclude vehicles, gaps between barricades must be smaller than the width of the excluded vehicles, generally 4 ft Provision must be made for ARFF access if necessary If barricades are intended to exclude pedestrians, they must be continuously linked. Continuous linking may be accomplished through the use of ropes, securely attached to prevent FOD.

(2) Lights must be red, either steady burning or flashing, and must meet the luminance requirements of the State Highway Department Batteries powering lights will last longer if lights flash. Lights must be mounted on barricades and spaced at no more than 10 ft. Lights must be operated between sunset and sunrise and during periods of low visibility whenever the airport is open for operations. They may be operated by photocell, but this may require that the contractor turn them on manually during periods of low visibility during daytime hours

(3) Supplement barricades with signs (for example "No Entry," "No Vehicles") as necessary

(4) Air Operations Area – General. Barricades are not permitted in any active safety area. Within a runway or taxiway object free area, and on aprons, use orange traffic cones, flashing or steady burning red lights as noted above, collapsible barricades marked with diagonal, alternating orange and

white stripes; and/or signs to separate all construction/maintenance areas from the movement area. Barricades may be supplemented with alternating orange and white flags at least 20 by 20 in (50 by 50 cm) square and securely fastened to eliminate FOD. All barricades adjacent to any open runway or taxiway / taxilane safety area, or apron must be as low as possible to the ground, and no more than 18 in high, exclusive of supplementary lights and flags. Barricades must be of low mass; easily collapsible upon contact with an aircraft or any of its components, and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, or other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, but not to exceed 3 in (7.6 cm) above the ground. Figure 2-5 and Figure 2-6 show sample barricades with proper coloring and flags.

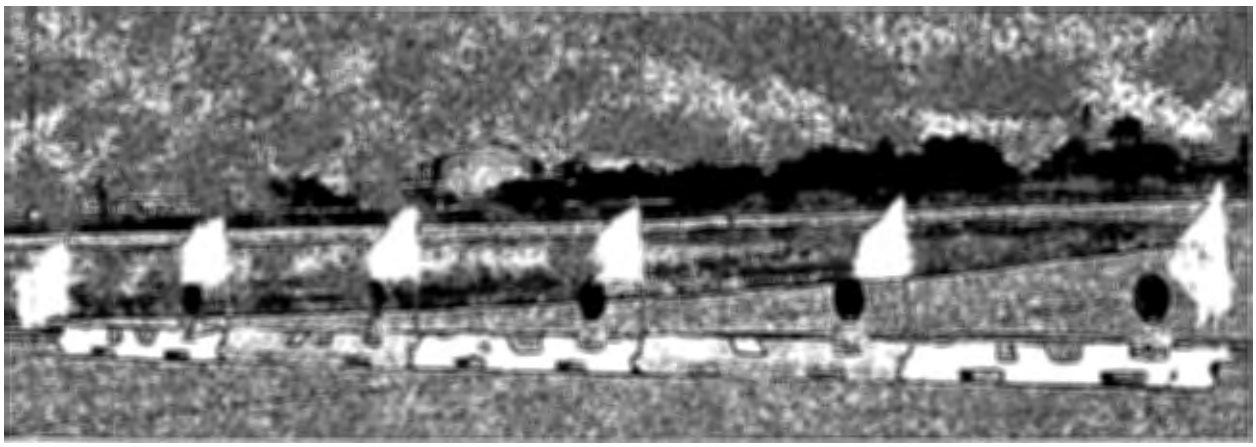

Figure 2-5 Interlocking Barricades

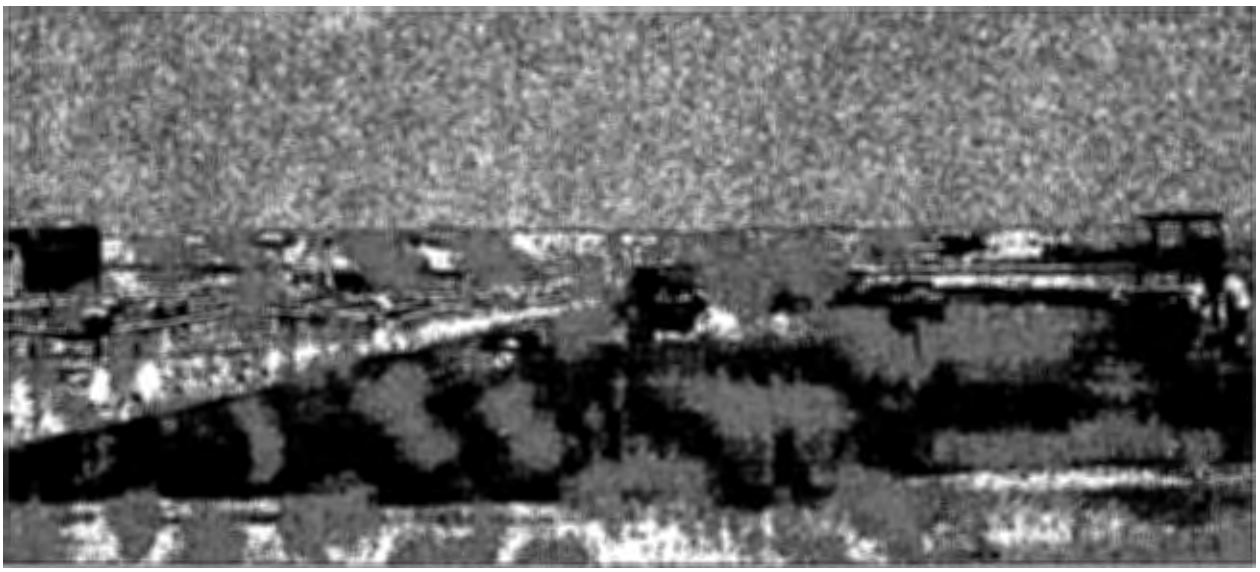

Figure 2-6 Low Profile Barricades

(5) Air Operations Area – Runway/Taxiway Intersections. Use highly reflective barricades with lights to close taxiways leading to closed runways. Evaluate all operating factors when determining how to mark temporary closures that can last from 10 to 15 minutes to a much longer period of time. However, even for closures of relatively short duration, close all taxiway/runway intersections with barricades. The use of traffic cones is appropriate for short duration closures.

(6) Air Operations Area – Other. Beyond runway and taxiway object free areas and

aprons, barricades intended for construction vehicles and personnel may be many different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels

(7) Maintenance. The construction specifications must include a provision requiring the contractor to have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades. The contractor must file the contact person's information with the airport operator. Lighting should be checked for proper operation at least once per day, preferably at dusk.

221. Protection of Runway and Taxiway Safety Areas. Runway and taxiway safety areas, Obstacle Free zones (OFZ), object free areas (OFA), and approach surfaces are described in AC 150/5300-13. Protection of these areas includes limitations on the location and height of equipment and stockpiled material. An FAA airspace study may be required. Coordinate with the appropriate FAA Airports Regional or District Office if there is any doubt as to requirements or dimensions (See paragraph 213 e above.) as soon as the location and height of materials or equipment are known. The CSPP should include drawings showing all safety areas, object free areas, obstacle free zones and approach departure surfaces affected by construction.

a. Runway Safety Area (RSA). A runway safety area is the defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway (see AC 150/5300-13) Construction activities within the existing RSA are subject to the following conditions

(1) No construction may occur within the existing RSA while the runway is open for aircraft operations. The RSA dimensions may be temporarily adjusted if the runway is restricted to aircraft operations requiring an RSA that is equal to the RSA width and length beyond the runway ends available during construction. (see AC 150/5300-13) The temporary use of declared distances and/or partial runway closures may provide the necessary RSA under certain circumstances Coordinate with the appropriate FAA Airports Regional or District Office to have declared distances information published See AC 150/5300-13 for guidance on the use of declared distances.

(2) The airport operator must coordinate the adjustment of RSA dimensions as permitted above with the appropriate FAA Airports Regional or District Office and the local FAA air traffic manager and issue a NOTAM

(3) The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations.

(4) Excavations.

(a) Open trenches or excavations are not permitted within the RSA while the runway is open. If possible, backfill trenches before the runway is opened. If the runway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the runway across the trench without damage to the aircraft.

(b) Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness

(5) Erosion Control. Soil erosion must be controlled to maintain RSA standards, that is, the RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

b. Runway Object Free Area (ROFA). Construction, including excavations, may be permitted in the ROFA. However, equipment must be removed from the ROFA when not in use, and material should not be stockpiled in the ROFA if not necessary. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval

c. Taxiway Safety Area (TSA). A taxiway safety area is a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway. (See AC 150/5300-13.) Construction activities within the TSA are subject to the following conditions:

(1) No construction may occur within the TSA while the taxiway is open for aircraft operations The TSA dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a TSA that is equal to the TSA width available during construction (see AC 150/5300-13, Table 4-1).

(2) The airport operator must coordinate the adjustment of the TSA width as permitted above with the appropriate FAA Airports Regional or District Office and the FAA air traffic manager and issue a NOTAM

(3) The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations.

(4) Excavations.

(a) Open trenches or excavations are not permitted within the TSA while the taxiway is open. If possible, backfill trenches before the taxiway is opened. If the taxiway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the taxiway across the trench without damage to the aircraft.

(b) Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(5) Erosion Control. Soil erosion must be controlled to maintain TSA standards, that is, the TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft

d. Taxiway Object Free Area (TOFA). Unlike the Runway Object Free Area, aircraft wings regularly penetrate the taxiway object free area during normal operations. Thus the restrictions are more stringent. Except as provided below, no construction may occur within the taxiway object free area while the taxiway is open for aircraft operations.

(1) The taxiway object free area dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a taxiway object free area that is equal to the taxiway object free area width available

(2) Offset taxiway pavement markings may be used as a temporary measure to provide the required taxiway object free area Where offset taxiway pavement markings are provided, centerline lighting or reflectors are required

(3) Construction activity may be accomplished without adjusting the width of the taxiway object free area, subject to the following restrictions:

(a) Appropriate NOTAMs are issued.

(b) Marking and lighting meeting the provisions of paragraphs 218 and 220 above are implemented

(c) Five-foot clearance is maintained between equipment and materials and any part of an aircraft (includes wingtip overhang). In these situations, flaggers must be used to direct construction equipment, and wing walkers will be necessary to guide aircraft Wing walkers should be airline/aviation personnel rather than construction workers If such clearance can only be maintained if an aircraft does not have full use of the entire taxiway width (with its main landing gear at the edge of the pavement), then it will be necessary to move personnel and equipment for the passage of that aircraft.

e. Obstacle Free Zone (OFZ). In general, personnel, material, and/or equipment may not penetrate the OFZ while the runway is open for aircraft operations. If a penetration to the OFZ is necessary, it may be possible to continue aircraft operations through operational restrictions. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office

f. Runway Approach/Departure Areas and Clearways. All personnel, materials, and/or equipment must remain clear of the applicable threshold siting surfaces, as defined in Appendix 2, "Threshold Siting Requirements," of AC 150/5300-13. Objects that do not penetrate these surfaces may still be obstructions to air navigation and may affect standard instrument approach procedures. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office

(1) Construction activity in a runway approach/departure area may result in the need to partially close a runway or displace the existing runway threshold. Partial runway closure, displacement of the runway threshold, as well as closure of the complete runway and other portions of the movement area also require coordination through the airport operator with the appropriate FAA air traffic manager (FSS if non-towered) and ATO/Technical Operations (for affected NAVAIDS) and airport users.

(2) Caution regarding partial runway closures. When filing a NOTAM for a partial runway closure, clearly state to OCC personnel that the portion of pavement located prior to the threshold is not available for landing and departing traffic. In this case, the threshold has been moved for both landing and takeoff purposes (this is different than a displaced threshold). There may be situations where the portion of closed runway is available for taxiing only. If so, the NOTAM must reflect this condition)

(3) Caution regarding displaced thresholds. : Implementation of a displaced threshold affects runway length available for aircraft landing over the displacement Depending on the reason for the displacement (to provide obstruction clearance or RSA), such a displacement may also require an adjustment in the landing distance available and accelerate-stop distance available in the opposite direction If project scope includes personnel, equipment, excavation, other work within the existing RSA of any usable runway end, do not implement a displaced threshold unless arrivals and departures toward the construction activity are prohibited Instead, implement a partial closure

222. Other Limitations on Construction. The CSPP must specify any other limitations on construction, including but not limited to

a. Prohibitions.

(1) No use of tall equipment (cranes, concrete pumps, and so on) unless a 7460-1 determination letter is issued for such equipment

(2) No use of open flame welding or torches unless fire safety precautions are provided and the airport operator has approved their use.

(3) No use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.

See AC 150/5370-10.

(4) **No use of flare pots** within the AOA

b. Restrictions.

(1) Construction suspension required during specific airport operations.

(2) Areas that cannot be worked on simultaneously.

(3) Day or night construction restrictions.

(4) Seasonal construction restrictions.

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Chapter 3. Guidelines for Writing a CSPP

301. General Requirements. The CSPP is a standalone document written to correspond with the subjects outlined in Chapter 2, Section 1, paragraph 204. The CSPP is organized by numbered sections corresponding to each subject listed in Chapter 2, Section 1, paragraph 204, and described in detail in Chapter 2, Section 2 Each section number and title in the CSPP matches the corresponding subject outlined in Chapter 2, paragraph 204 (for example, 1. Coordination, 2. Phasing, 3. Areas and Operations Affected by the Construction Activity, and so on.). With the exception of the project scope of work outlined in Section 2 Phasing, only subjects specific to operational safety during construction should be addressed

302. Applicability of Subjects. Each section should, to the extent practical, focus on the specific subject Where an overlapping requirement spans several sections, the requirement should be explained in detail in the most applicable section. A reference to that section should be included in all other sections where the requirement may apply. For example, the requirement to protect existing underground FAA Instrument Landing System (ILS) cables during trenching operations could be considered FAA ATO coordination (Section 1. Coordination, paragraph 205.c), an area and operation affected by the construction activity (Section 3. Areas and Operations Affected by the Construction Activity, paragraph 207.a(4)), a protection of a NAVAID (Section 4. Protection of Navigational Aids (NAVAIDs),paragraph 208), or a notification to the FAA of construction activities (Section 9 Notification of Construction Activities, paragraph 210.e(3)(b)). However, it is more specifically an underground utility requirement (Section 11 Underground Utilities, paragraph 215). The procedure for protecting underground ILS cables during trenching operations should therefore be described in Section 11: "*The contractor must coordinate with the local FAA System Support Center (SSC) to mark existing ILS cable routes along Runway 17-35 The ILS cables will be located by hand digging whenever the trenching operation moves within 10 feet of the cable markings.*" All other applicable sections should include a reference to Section 11: "*ILS cables shall be identified and protected as described in Section 11*" or "*See Section 11 for ILS cable identification and protection requirements.*" Thus, the CSPP should be considered as a whole, with no need to duplicate responses to related issues.

303. Graphical Representations. Construction safety drawings should be included in the CSPP as attachments When other graphical representations will aid in supporting written statements, the drawings, diagrams, and/or photographs should also be attached to the CSPP. References should be made in the CSPP to each graphical attachment and may be made in multiple sections.

304. Reference Documents. The CSPP must not incorporate a document by reference unless reproduction of the material in that document is prohibited. In that case, either copies of or a source for the referenced document must be provided to the contractor.

305. Restrictions. The CSPP should not be considered as a project design review document. The CSPP should also avoid mention of permanent ("as-built") features such as pavements, markings, signs, and lighting, except when such features are intended to aid in maintaining operational safety during the construction.

306. Coordination. Include in this section a detailed description of conferences and meetings both before and during the project. Include appropriate information from AC 150/5300-9. Discuss coordination procedures and schedules for each required FAA ATO airway facility shutdown and restart and all required flight inspections.

307. Phasing. Include in this section a detailed scope of work description for the project as a whole and each phase of work covered by the CSPP. This includes all locations and durations of the work proposed. Attach drawings to graphically support the written scope of work. Detail in this section the sequenced phases of the proposed construction. Include a reference to paragraph 308 below, as appropriate.

308. Areas and Operations Affected By Construction. Focus in this section on identifying the areas and operations affected by the construction. Describe corresponding mitigation that is not covered in detail elsewhere in the CSPP. Include references to paragraphs below as appropriate. Attach drawings as necessary to graphically describe affected areas and mechanisms proposed Tables and charts such as the following may be helpful in highlighting issues to be addressed.

Table 3-1 Sample Operations Effects

Project	Runway 15-33 Reconstruction	
Phase	Phase II Reconstruct Runway 15 End	
Scope of Work	Reconstruct 1,000 ft of north end of Runway 15-33 with Portland Cement Concrete (PCC)	
Operational Requirements	**Normal (Existing)**	**Phase II (Anticipated)**
Runway 15 Average Aircraft Operations	Carrier 52 /day GA 26 /day Military 11 /day	Carrier 52 / day GA 20 / day Military 0 /day
Runway 33 Average Aircraft Operations	Carrier 40 /day GA 18 /day Military 10 /day	Carrier· 20 /day GA 5 /day Military 0 /day
Runway 15-33 ARC	C-IV	C-IV
Runway 15 Approach Visibility Minimums	¾ mile	1 mile
Runway 33 Approach Visibility Minimums	¾ mile	1 mile
Runway 15 Declared Distances	TORA 7,820	TORA 6,420
	TODA 7,820	TODA 6,420
	ASDA 7,820	ASDA. 6,420
	LDA 7,820	LDA 6,420
Runway 33 Declared Distances	TORA 8,320	TORA 6,920
	TODA 8,320	TODA 6,920
	ASDA 8,320	ASDA 6,920
	LDA 7,820	LDA 6,420
Runway 15 Approach Procedures	ILS	LOC only
	RNAV	N/A
	VOR	N/A
Runway 33 Approach Procedures	ILS	Visual only
	RNAV	N/A
	VOR	N/A
Runway 15 NAVAIDs	ILS/DME, MALSR, RVR	LOC/DME, PAPI (temp), RVR

Runway 33 NAVAIDs	ILS/DME, MALSF, PAPI, RVR	MALSF, PAPI, RVR
Taxiway G ADG	IV	IV (N/A between T/W H and R/W 15 end)
Taxiway E ADG	IV	IV
ATCT (hours open)	06 00 – 24 00 local	06·00 – 24 00 local
ARFF Index	D	D
Special Conditions	Air National Guard (ANG) military operations	Military operations relocated to alternate ANG Base
	Airline XYZ requires VGSI	Airline XYZ requires VGSI

Complete the following chart for each phase to determine the area that must be protected along the runway edges·

Runway	Aircraft Approach Category* A, B, C, or D	Airplane Design Group* I, II, III, or IV	RSA Width in Feet Divided by 2*
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
*See AC 150/5300-13 to complete the chart for a specific runway			

Complete the following chart for each phase to determine the area that must be protected before the runway threshold:

Runway End Number	Airplane Design Group* I, II, III, or IV	Aircraft Approach Category* A, B, C, or D	Minimum Safety Area Prior to the Threshold*	Minimum Distance to Threshold Based on Required Approach Slope*	
_____	_____	_____	_____ ft	_____ ft	_____ 1
_____	_____	_____	_____ ft	_____ ft	_____ 1
_____	_____	_____	_____ ft	_____ ft	_____ 1
_____	_____	_____	_____ ft	_____ ft	_____ 1
*See AC 150/5300-13 to complete the chart for a specific runway					

309. Navigation Aid (NAVAID) Protection. List in this section all NAVAID facilities that will be affected by the construction. Identify NAVAID facilities that will be placed out of service at any time prior to or during construction activities. Identify individuals responsible for coordinating each shutdown and when each facility will be out of service Include a reference to paragraph 306 above for FAA ATO NAVAID shutdown, restart, and flight inspection coordination. Outline in detail procedures to protect each NAVAID facility remaining in service from interference by construction activities. Include a reference to paragraph 314 for the issuance of NOTAMs as required Include a reference to paragraph 316 for the protection of underground cables and piping serving NAVAIDs. If temporary visual aids are proposed to replace or supplement existing facilities, include a reference to paragraph 319. Attach drawings to graphically indicate the affected NAVAIDS and the corresponding critical areas.

310. Contractor Access. This will necessarily be the most extensive section of the CSPP. Provide

sufficient detail so that a contractor not experienced in working on airports will understand the unique restrictions such work will require. Due to this extent, it should be broken down into subsections as described below·

a. Location of Stockpiled Construction Materials. Describe in this section specific locations for stockpiling material. Note any height restrictions on stockpiles. Include a reference to paragraph 321 for hazard marking and lighting devices used to identify stockpiles Include a reference to paragraph 311 for provisions to prevent stockpile material from becoming wildlife attractants. Include a reference to paragraph 312 for provisions to prevent stockpile material from becoming FOD. Attach drawings to graphically indicate the stockpile locations.

b. Vehicle and Pedestrian Operations. While there are many items to be addressed in this major subsection of the CSPP, all are concerned with one main issue· keeping people and vehicles from areas of the airport where they don't belong. This includes preventing unauthorized entry to the AOA and preventing the improper movement of pedestrians or vehicles on the airport. In this section, focus on mechanisms to prevent construction vehicles and workers traveling to and from the worksite from unauthorized entry into movement areas. Specify locations of parking for both employee vehicles and construction equipment, and routes for access and haul roads. In most cases, this will best be accomplished by attaching a drawing. Quote from AC 150/5210-5 specific requirements for contractor vehicles rather than referring to the AC as a whole, and include special requirements for identifying Hazardous Material (HAZMAT) vehicles. Quote from, rather than incorporate by reference, AC 150/5210-20 as appropriate to address the airport's rules for ground vehicle operations, including its training program. Discuss the airport's recordkeeping system listing authorized vehicle operators.

c. Two-Way Radio Communications. Include a special section to identify all individuals who are required to maintain communications with Air Traffic (AT) at airports with active towers, or monitor Common Traffic Advisory Frequencies (CTAF) at airports without or with closed ATCT. Include training requirements for all individuals required to communicate with AT. Individuals required to monitor AT frequencies should also be identified. If construction employees are also required to communicate by radio with Airport Operations, this procedure should be described in detail. Usage of vehicle mounted radios and/or portable radios should be addressed. Communication procedures for the event of disabled radio communication (that is, light signals, telephone numbers, others) must be included. All radio frequencies should by identified (Tower, Ground Control, CTAF, UNICOM, ATIS, and so on)

d. Airport Security. Address security as it applies to vehicle and pedestrian operations. Discuss TSA requirements, security badging requirements, perimeter fence integrity, gate security, and other needs. Attach drawings to graphically indicate secured and/or Security Identification Display Areas (SIDA), perimeter fencing, and available access points.

311. Wildlife Management. Discuss in this section wildlife management procedures Describe the maintenance of existing wildlife mitigation devices, such as perimeter fences, and procedures to limit wildlife attractants. Include procedures to notify Airport Operations of wildlife encounters. Include a reference to paragraph 310 for security (wildlife) fence integrity maintenance as required

312. Foreign Object Debris (FOD) Management. In this section, discuss methods to control and monitor FOD· worksite housekeeping, ground vehicle tire inspections, runway sweeps, and so on. Include a reference to paragraph 315 for inspection requirements as required

313. Hazardous Materials (HAZMAT) Management. Describe in this section HAZMAT management procedures. fuel deliveries, spill recovery procedures, Material Safety Data Sheet (MSDS) availability, and other considerations. Any specific airport HAZMAT restrictions should also be

identified Include a reference to paragraph 310 for HAZMAT vehicle identification requirements Quote from, rather than incorporate by reference, AC 150/5320-15.

314. Notification of Construction Activities. List in this section the names and telephone numbers of points of contact for all parties affected by the construction project. We recommend a single list that includes all telephone numbers required under this section. Include emergency notification procedures for all representatives of all parties potentially impacted by the construction. Identify individual representatives – and at least one alternate – for each party. List both on-duty and off-duty contact information for each individual, including individuals responsible for emergency maintenance of airport construction hazard lighting and barricades. Describe procedures to coordinate immediate response to events that might adversely affect the operational safety of the airport (such as interrupted NAVAID service) Explain requirements for and the procedures for the issuance of Notices to Airmen (NOTAMs), notification to FAA required by 14 CFR Part 77 and Part 157 and in the event of affected NAVAIDs For NOTAMs, identify an individual, and at least one alternate, responsible for issuing and cancelling each specific type of Notice to Airmen (NOTAM) required. Detail notification methods for police, fire fighting, and medical emergencies. This may include 911, but should also include direct phone numbers of local police departments and nearby hospitals. The local Poison Control number should be listed Procedures regarding notification of Airport Operations and/or the ARFF Department of such emergencies should be identified, as applicable If airport radio communications are identified as a means of emergency notification, include a reference to paragraph 310. Differentiate between emergency and nonemergency notification of ARFF personnel, the latter including activities that affect ARFF water supplies and access roads. Identify the primary ARFF contact person and at least one alternate. If notification is to be made through Airport Operations, then detail this procedure Include a method of confirmation from the ARFF department

315. Inspection Requirements. Describe in this section inspection requirements to ensure airfield safety compliance Include a requirement for routine inspections by the resident engineer (RE) and the construction contractors. If the engineering consultants and/or contractors have a Safety Officer who will conduct such inspections, identify this individual. Describe procedures for special inspections, such as those required to reopen areas for aircraft operations. Part 139 requires daily airfield inspections at certificated airports, but these may need to be more frequent when construction is in progress. Discuss the role of such inspections on areas under construction. Include a requirement to immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

316. Underground Utilities. Explain how existing underground utilities will be located and protected Identify each utility owner and include contact information for each company/agency in the master list. Address emergency response procedures for damaged or disrupted utilities. Include a reference to paragraph 314 above for notification of utility owners of accidental utility disruption as required.

317. Penalties. Describe in this section specific penalties imposed for noncompliance with airport rules and regulations, including the CSPP. SIDA violations, Vehicle/Pedestrian Deviations (VPD), and others

318. Special Conditions. Identify any special conditions that may trigger specific safety mitigation actions outlined in this CSPP· low visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, VPD, and other activities requiring construction suspension/resumption Include a reference to paragraph 310 above for compliance with airport safety and security measures and for radio communications as required Include a reference to paragraph 319 below for emergency notification of all involved parties, including police/security, ARFF, and medical services.

319. Runway and Taxiway Visual Aids. Include marking, lighting, signs, and visual NAVAIDS.

Detail temporary runway and taxiway marking, lighting, signs, and visual NAVAIDs required for the construction. Discuss existing marking, lighting, signs, and visual NAVAIDs that are temporarily, altered, obliterated, or shut down. Consider non-federal facilities and address requirements for reimbursable agreements necessary for alteration of FAA facilities and for necessary flight checks. Identify temporary TORA signs or runway distance remaining signs if appropriate. Identify required temporary visual NAVAIDs such as REIL or PAPI. Quote from, rather than incorporate by reference, AC 150/5340-1, Standards for Airport Markings, AC 150/5340-18, Standards for Airport Sign Systems, and AC 150/5340-30, as required Attach drawings to graphically indicate proposed marking, lighting, signs, and visual NAVAIDs

320. Marking and Signs for Access Routes. Detail plans for marking and signs for vehicle access routes To the extent possible, signs should be in conformance with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or State highway specifications, not hand lettered. Detail any modifications to the guidance in the MUTCD necessary to meet frangibility/height requirements

321. Hazard Marking and Lighting. Specify all marking and lighting equipment, including when and where each type of device is to be used. Specify maximum gaps between barricades and the maximum spacing of hazard lighting. Identify one individual and at least one alternate responsible for maintenance of hazard marking and lighting equipment in the master telephone list. Include a reference to paragraph 314 above. Attach drawings to graphically indicate the placement of hazard marking and lighting equipment

322. Protection of Runway and Taxiway Safety Areas. This section should focus exclusively on procedures for protecting all safety areas, including those altered by the construction: methods of demarcation, limit of access, movement within safety areas, stockpiling and trenching restrictions, and so on Reference AC 150/5300-13: Airport Design as required Include a reference to paragraph 310 above for procedures regarding vehicle and personnel movement within safety areas Include a reference to paragraph 310 above for material stockpile restrictions as required. Detail requirements for trenching, excavations, and backfill. Include a reference to paragraph 321 for hazard marking and lighting devices used to identify open excavations as required. If runway and taxiway closures are proposed to protect safety areas, or if temporary displaced thresholds and/or revised declared distances are used to provide adequate Runway Safety Area, include a reference to paragraphs 314 and 319 above. Detail procedures for protecting the runway OFZ, runway OFA, taxiway OFA and runway approach surfaces including those altered by the construction: methods of demarcation, limit of cranes, storage of equipment, and so on Quote from, rather than incorporate by reference, AC 150/5300-13· Airport Design as required. Include a reference to paragraph 323 for height (i.e crane) restrictions as required. One way to address the height of equipment that will move during the project is to establish a three-dimensional "box" within which equipment will be confined that can be studied as a single object. Attach drawings to graphically indicate the safety area, OFZ, and OFA boundaries.

323. Other Limitations on Construction. This section should describe what limitations must be applied to each area of work and when each limitation will be applied. limitations due to airport operations, height (i e. crane) restrictions, areas which cannot be worked at simultaneously, day/night work restrictions, winter construction, and other limitations. Include a reference to paragraph 307 above for project phasing requirements based on construction limitations as required.

Appendix 1. Related Reading Material

Obtain the latest version of the following free publications from the FAA on its Web site at http://www.faa.gov/airports/.

AC	Title and Description
AC 150/5200-28	Notices to Airmen (NOTAMs) for Airport Operators
	Guidance for using the NOTAM System in airport reporting
AC 150/5200-30	Airport Winter Safety and Operations
	Guidance for airport owners/operators on the development of an acceptable airport snow and ice control program and on appropriate field condition reporting procedures
AC 150/5200-33	Hazardous Wildlife Attractants On or Near Airports
	Guidance on locating certain land uses that might attract hazardous wildlife to public-use airports
AC 150/5210-5	Painting, Marking, and Lighting of Vehicles Used on an Airport
	Guidance, specifications, and standards for painting, marking, and lighting vehicles operating in the airport air operations areas
AC 150/5210-20	Ground Vehicle Operations on Airports
	Guidance to airport operators on developing ground vehicle operation training programs.
AC 150/5300-13	Airport Design
	FAA standards and recommendations for airport design, establishes approach visibility minimums as an airport design parameter, and contains the Object Free area and the obstacle free-zone criteria
AC 150/5310-24	Airport Foreign Object Debris Management
	Guidance for developing and managing an airport foreign object debris (FOD) program
AC 150/5220-4	Water Supply Systems for Aircraft Fire and Rescue Protection
	Guidance on selecting a water source and meeting standards for a distribution system to support aircraft rescue and fire fighting service operations on airports
AC 150/5320-15	Management of Airport Industrial Waste
	Basic information on the characteristics, management, and regulations of industrial wastes generated at airports Guidance for developing a Storm Water Pollution Prevention Plan (SWPPP) that applies best management practices to eliminate, prevent, or reduce pollutants in storm water runoff with particular airport industrial activities
AC 150/5340-1	Standards for Airport Markings
	FAA standards for markings used on airport runways, taxiways, and aprons
AC 150/5340-18	Standards for Airport Sign Systems
	FAA standards for the siting and installation of signs on airport runways and taxiways
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
	FAA standards for PAPI systems, which provide pilots with visual glide slope guidance during approach for landing

AC	Title and Description
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
	Guidance and recommendations on the installation of airport visual aids
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-44	Specification for Runway and Taxiway Signs
	FAA specifications for unlighted and lighted signs for taxiways and runways
AC 150/5345-53	Airport Lighting Certification Program
	Details on the Airport Lighting Equipment Certification Program (ALECP).
AC 150/5345-50	Specification for Portable Runway and Taxiway Lights
	FAA standards for portable runway and taxiway lights and runway end identifier lights for temporary use to permit continued aircraft operations while all or part of a runway lighting system is inoperative
AC 150/5345-55	Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure
AC 150/5370-10	Standards for Specifying Construction of Airports
	Standards for construction of airports, including earthwork, drainage, paving, turfing, lighting, and incidental construction
FAA Order 5200 11	FAA Airports (ARP) Safety Management System (SMS)
	Basics for implementing SMS within ARP Includes roles and responsibilities of ARP management and staff as well as other FAA lines of business that contribute to the ARP SMS
FAA Certalert 98-05	Grasses Attractive to Hazardous Wildlife
	Guidance on grass management and seed selection
FAA Form 7460-1	Notice of Proposed Construction or Alteration
FAA Form 7480-1	Notice of Landing Area Proposal

Obtain the latest version of the following free publications from the Electronic Code of Federal Regulations at http://ecfr gpoaccess gov/

Title 14 CFR Part 139	Certification of Airports
Title 49 CFR Part 1542	Airport Security

Obtain the latest version of the Manual on Uniform Traffic Control Devices from the Federal Highway Administration at http //mutcd fhwa dot gov/.

Appendix 2. Definition of Terms

Term	Definition
7460-1	Notice Of Proposed Construction Or Alteration. For on-airport projects, the form submitted to the FAA regional or airports division office as formal written notification of any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR Part 77, safe, efficient use, and preservation of the navigable airspace (See guidance available on the FAA web site at oeaaa faa gov) The form may be downloaded at http //www faa gov/airports/resources/forms/, or filed electronically at. https //oeaaa faa gov
7480-1	Notice Of Landing Area Proposal Form submitted to the FAA Airports Regional Division Office or Airports District Office as formal written notification whenever a project without an airport layout plan on file with the FAA involves the construction of a new airport, the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway, or the deactivation or abandoning of an entire airport The form may be downloaded at http //www faa gov/airports/resources/forms/
AC	Advisory Circular
ACRC	Aircraft Reference Code
ACSI	Airport Certification Safety Inspector
ADG	Airplane Design Group
AIP	Airport Improvement Program
ALECP	Airport Lighting Equipment Certification Program
ANG	Air National Guard
AOA	Air Operations Area Any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft An air operations area includes such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runways, taxiways, or aprons
ARFF	Aircraft Rescue and Fire Fighting
ARP	FAA Office of Airports
ASDA	Accelerate-Stop Distance Available
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
ATO	Air Traffic Organization
Certificated 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
CFR	Code of Federal Regulations
Construction	The presence and movement of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft
CSPP	Construction Safety And Phasing Plan The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator It is included in the invitation for bids and becomes part of the project specifications

Term	Definition
CTAF	Common Traffic Advisory Frequency
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway The portion of pavement behind a displaced threshold is available for takeoffs in either direction or landing from the opposite direction
DOT	Department of Transportation
EPA	Environmental Protection Agency
FOD	Foreign Object Debris
HAZMAT	Hazardous Materials
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LDA	Landing Distance Available
LOC	Localizer antenna array
Movement Area	The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading aprons and aircraft parking areas (reference 14 CFR Part 139)
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
NAVAID	Navigation Aid
NAVAID Critical Area	An area of defined shape and size associated with a NAVAID that must remain clear and graded to avoid interference with the electronic signal
Non-Movement Area	The area inside the airport security fence exclusive of the Movement Area It is important to note that the non-movement area includes pavement traversed by aircraft
NOTAM	Notices to Airmen
Obstruction	Any object/obstacle exceeding the obstruction standards specified by 14 CFR Part 77, subpart C
OE / AAA	Obstruction Evaluation / Airport Airspace Analysis
OFA	Object Free Area An area on the ground centered on the runway, taxiway, or taxi lane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes (See AC 150/5300-13, for additional guidance on OFA standards and wingtip clearance criteria)
OFZ	Obstacle Free Zone The airspace below 150 ft (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches The OFZ is subdivided as follows Runway OFZ, Inner Approach OFZ, Inner Transitional OFZ, and Precision OFZ Refer to AC 150/5300-13 for guidance on OFZ
OSHA	Occupational Safety and Health Administration
P&R	Planning and Requirements Group

Term	Definition
PAPI	Precision Approach Path Indicators
PFC	Passenger Facility Charge
PLASI	Pulse Light Approach Slope Indicators
Project Proposal Summary	A clear and concise description of the proposed project or change that is the object of Safety Risk Management
RE	Resident Engineer
REIL	Runway End Identifier Lights
RNAV	Area Navigation
ROFA	Runway Object Free Area
RSA	Runway Safety Area A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13
SIDA	Security Identification Display Area
SMS	Safety Management System
SPCD	Safety Plan Compliance Document Details developed and submitted by a contractor to the airport operator for approval providing details on how the performance of a construction project will comply with the CSPP
SRM	Safety Risk Management
Taxiway Safety Area	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway, in accordance with AC 150/5300-13
TDG	Taxiway Design Group
Temporary	Any condition that is not intended to be permanent
Temporary Runway End	The beginning of that portion of the runway available for landing and taking off in one direction, and for landing in the other direction Note the difference from a displaced threshold
Threshold	The beginning of that portion of the runway available for landing In some instances, the landing threshold may be displaced.
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available The length of the runway less any length of runway unavailable and/or unsuitable for takeoff run computations See AC 150/5300-13 for guidance on declared distances
TSA	Taxiway Safety Area Transportation Security Administration
UNICOM	A radio communications system of a type used at small airports.
VASI	Visual Approach Slope Indicators

Term	Definition
VGSI	Visual Glide Slope Indicator. A device that provides a visual glide slope indicator to landing pilots These systems include precision approach path indicators (PAPI), visual approach slope indicators (VASI), and pulse light approach slope indicators (PLASI).
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Radio Range
VPD	Vehicle / Pedestrian Deviation

Appendix 3. Safety and Phasing Plan Checklist

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

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

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

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

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

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

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

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

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

Appendix 4. Construction Project Daily Safety Inspection Checklist

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. The list below is one tool that the airport operator or contractor may use to aid in identifying and correcting potentially hazardous conditions. It should be customized as appropriate for each project.

Potentially Hazardous Conditions

Item	Action Required	or	None
Excavation adjacent to runways, taxiways, and aprons improperly backfilled			☐
Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxi lane, in the related Object Free area and aircraft approach or departure areas/zones, or obstructing any sign or marking			☐
Runway resurfacing projects resulting in lips exceeding 3 in (7 6 cm) from pavement edges and ends			☐
Heavy equipment (stationary or mobile) operating or idle near AOA, in runway approaches and departures areas, or in OFZ.			☐
Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigation and visual aids Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown			☐
Tall and especially relatively low visibility units (that is, equipment with slim profiles) — cranes, drills, and similar objects — located in critical areas, such as OFZ and approach zones			☐
Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxi lane or in a related safety, approach, or departure area			☐
Obstacles, loose pavement, trash, and other debris on or near AOA Construction debris (gravel, sand, mud, paving materials) on airport pavements may result in aircraft propeller, turbine engine, or tire damage Also, loose materials may blow about, potentially causing personal injury or equipment damage			☐

Item	Action Required	or	None
Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA Fencing and other markings that are inadequate to separate construction areas from open AOA create aviation hazards			☐
Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA create aviation hazards			☐
Wildlife attractants — such as trash (food scraps not collected from construction personnel activity), grass seeds, tall grass, or standing water — on or near airports			☐
Obliterated or faded temporary markings on active operational areas			☐
Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards			☐
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions			☐
Failure to mark and identify utilities or power cables Damage to utilities and power cables during construction activity can result in the loss of runway / taxiway lighting, loss of navigation, visual, or approach aids, disruption of weather reporting services; and/or loss of communications			☐
Restrictions on ARFF access from fire stations to the runway / taxiway system or airport buildings			☐
Lack of radio communications with construction vehicles in airport movement areas			☐
Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport that could be distracting, confusing, or alarming to pilots during aircraft operations			☐
Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction			☐
Spillage from vehicles (gasoline, diesel fuel, oil) on active pavement areas, such as runways, taxiways, aprons, and airport roadways			☐

Item	Action Required	or	None
Failure to maintain drainage system integrity during construction (for example, no temporary drainage provided when working on a drainage system)			☐
Failure to provide for proper electrical lockout and tagging procedures At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits			☐
Failure to control dust Consider limiting the amount of area from which the contractor is allowed to strip turf			☐
Exposed wiring that creates an electrocution or fire ignition hazard Identify and secure wiring, and place it in conduit or bury it			☐
Site burning, which can cause possible obscuration			☐
Construction work taking place outside of designated work areas and out of phase			☐

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U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: Painting, Marking, and Lighting of Vehicles Used on an Airport

Date: April 1, 2010

Initiated by: AAS-100

AC No: AC 150/5210-5D

Change:

1. PURPOSE. This advisory circular (AC) provides guidance, specifications, and standards for painting, marking, and lighting of vehicles operating in the airport air operations area (AOA). The approved lights, colors, and markings herein assure the conspicuity of vehicles operating in the AOA from both the ground and the air.

2. CANCELLATION. This AC cancels AC 150/5210-5C, Painting, Marking, and Lighting of Vehicles Used on an Airport, dated August 31, 2007.

3. APPLICATION. The Federal Aviation Administration (FAA) recommends the guidelines and standards in this Advisory Circular for vehicles operating in the airport AOA. In general, use of this AC is not mandatory. ***However***, use of this AC is mandatory for vehicles funded with federal grant monies through the Airport Improvement Program (AIP) and/or with revenue from the Passenger Facility Charges (PFC) Program. See Grant Assurance No 34, "Policies, Standards, and Specifications," and PFC Assurance No 9, "Standard and Specifications."

Vehicles covered by this AC that do not meet this standard may be used until the vehicle is repainted or replaced, but no later than **December 31, 2010.**

4. PRINCIPAL CHANGES. This AC contains new specifications and recommendations for the painting, marking, and lighting of Towbarless Tow Vehicles (TLTVs).

5. METRIC UNITS. To promote an orderly transition to metric units, this AC includes both English and metric dimensions The metric conversions may not be exact equivalents, and until there is an official changeover to the metric system, the English dimensions will govern.

6. COMMENTS OR SUGGESTIONS for improvements to this AC should be sent to.

Manager, Airport Engineering Division
Federal Aviation Administration
ATTN: AAS-100
800 Independence Avenue, S.W.
Washington, DC 20591

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

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PAINTING, MARKING, AND LIGHTING OF VEHICLES USED ON AN AIRPORT

1. **SOURCES OF APPLICABLE DOCUMENTS.**

a. American National Standards Institute, Inc. (ANSI), 25 West 43rd St 4th Floor, New York, NY 10036. Website: **www.ansi.org**

b. American Society for Testing & Materials (ASTM), ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Website: **www.astm.org**

c. The National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, Massachusetts 02169-7471. Website: **www.nfpa.org**

d. The U S. General Services Administration (GSA), Centralized Mailing List Services, 501 West Felix Street, Whse 9, South End P O Box 6477, Fort Worth, Texas 76115-6477. Website: **www.gsa.gov**

e. The Superintendent of Documents, U.S. Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401

f. Society of Automotive Engineers, Inc (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001. Website· **www.sae.org**

g. FAA Advisory Circulars: U S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Ave., Landover, MD 20785 Website: **www.faa.gov**

h. FAA Engineering Briefs: **www.faa.gov/airports/engineering/engineering_briefs/**

2. **DEFINITIONS.** The following definitions apply in this AC·

a. **Vehicle** – All conveyances, except aircraft, used on the ground to transport persons, cargo, equipment or those required to perform maintenance, construction, service, and security duties.

b. **Air Operations Area (AOA)** – The portion of airport that encompasses the landing, take off, taxiing, and parking areas for aircraft.

c. **Airport Emergency Vehicles** – Vehicles that are authorized in the AOA for emergency purposes (e.g., ambulances, aircraft rescue and fire fighting (ARFF) vehicles and emergency response vehicles) as authorized by the airport traffic control tower (ATCT) or an authorized on-site accident/incident commander.

d. **Airport Operations Vehicles** – Vehicles routinely used by airport operations personnel for airport inspection and duties associated with airfield operations (such as airfield condition reporting and Incident Command) on the AOA and Movement Area.

e. **Airport Security Vehicles** – Vehicles that are authorized in the AOA for security purposes, as needed (e g police cars).

f. Airfield Service Vehicles – Vehicles that are routinely used in the AOA for airfield service, maintenance, or construction (e.g. snow blowers, snowplows, maintenance trucks, and tractors).

g. Aircraft Support Vehicles – Vehicles that are routinely used in the AOA to support aircraft operations (e.g. aircraft pushback tractors, baggage/cargo tractors or trucks, air conditioning and aviation fuel trucks). These vehicles are typically owned by airlines, vendors, or contractors and are not eligible for Federal funding.

h. Reduced Visibility – Prevailing visibility is less than one statute mile (1609 meters) and/or the runway visual range (RVR) is less than 6,000 feet (1830 meters).

i. Movement Area – The runways, taxiways, and other areas of an airport/heliport that are used for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with an operating airport traffic control tower (ATCT), specific approval for entry onto the movement area must be obtained from air traffic control (ATC).

j. Other Vehicles – Vehicles that are not routinely authorized in the AOA (e.g. construction vehicles) These vehicles are typically owned by airlines, vendors, or contractors and are not eligible for Federal funding.

k. Peak Intensity – Peak intensity, for purposes of this document, means the maximum magnitude of luminescence as measured in candela.

l. Towbarless Tow Vehicle (TLTV) – a type of aircraft support vehicle whose main purpose is to tow aircraft in the AOA by way of nose gear capture

3. VEHICLE PAINTING.

NOTE: *Airport vehicle paint and markings are a safety of flight requirement. The approved colors/markings herein assure conspicuity of vehicles operating in the AOA from both the ground and air*

a. Airport Emergency Vehicles.

(1) Ambulances. Ambulance vehicles are painted per the most current version of Federal Specification KKK-A-1822, *Federal Specification for the Star-of-Life Ambulance*. Ambulances are not considered vehicles routinely operating on the AOA.

(2) Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Yellowish-green is the vehicle color standard Color specifications are per Appendix A.

NOTE: *A yellowish-green color provides optimum visibility during all light levels encountered during a 24-hour day and under variations of light that result from weather and seasonal changes.*

b. Airport Operations Vehicles. Airport operations vehicles may be painted in colors designated by the airport operator. The characteristics must be coordinated with the respective ATCT and identified in the tower letter of agreement.

c. Airport Security Vehicles. Comply with specific state or local requirements.

d. Airfield Service Vehicles. Chrome yellow is the vehicle color standard. Color specifications are per Appendix A When vehicles are equipped with bumper bars 8 inches (200 mm) or more in depth, the bars must be painted in alternate stripes 4 inches (100 mm) in width of chrome yellow and black inclined 45° to the vertical.

e. Aircraft Support Vehicles.

(1) Any color or combination of colors other than yellowish-green or chrome yellow. The bumper bar paint scheme in paragraph 3.d (of alternating chrome yellow and black stripe) is recommended.

(2) TLTVs. International orange is the vehicle color standard. Retroreflective tape covering more than 25 percent of the vehicle's vertical surfaces may be used as a temporary measure to meet this standard prior to scheduled vehicle painting

f. Other Vehicles. Any color or combination of colors other than solid black or white.

4. VEHICLE MARKING.

a. Airport Emergency Vehicles.

(1) Ambulances. Ambulances are marked per the most current version of Federal Specification KKK-A-1822.

(2) ARFF Vehicles. Emergency rescue and fire fighting vehicles are marked with the letters "ARFF, "Fire," or "Rescue" and in accordance with 4 c (1)-(5) of this AC.

b. Airport Operations Vehicles. Airport operations vehicles may be marked as designated by the airport operator Marking must be coordinated with the respective ATCT and identified in the tower letter of agreement.

c. Airfield Service Vehicles and Aircraft Support Vehicles.

(1) Airport operator owned vehicles must display an identification number on each side and on the roof (the hood should be used if the vehicle has no roof)

(2) Side numbers will be a minimum of 16 inches (410 mm) in height and conspicuously located

(3) Roof numbers will be a minimum of 24 inches (610 mm) in height and affixed with their bases toward the front of the vehicle The identification numbers should provide sharp color contrast to the vehicle color.

(4) In addition to the identification numbers, airport operator-owned vehicles must display either the name of the airport and/or the airport insignia.

(5) To further improve night-time recognition of vehicles, a minimum 8 inch (200 mm) wide horizontal band of high gloss white paint or white reflective tape (Retroreflective, ASTM-D 4956-09, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Type III & above) must be used around the vehicle's surface. Figures 1, 2, and 3 show suggested locations for the horizontal reflective band.

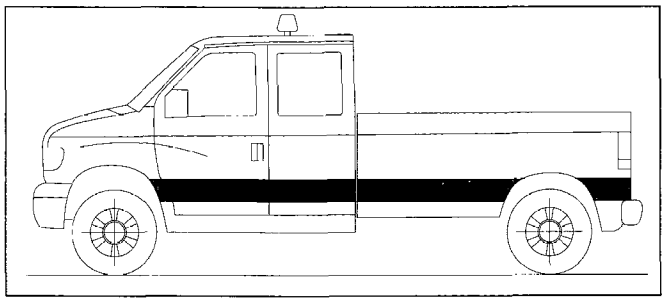

Figure 1: Suggested location for the horizontal reflective band, Option 1

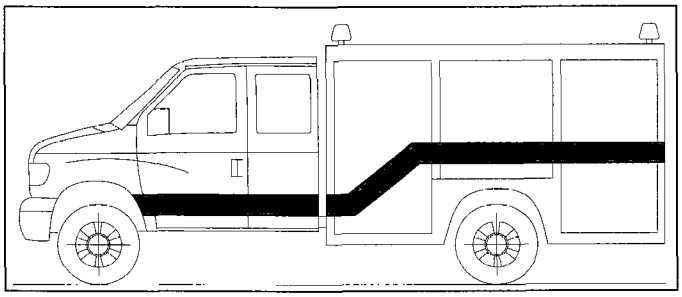

Figure 2: Suggested location for the horizontal reflective band, Option 2

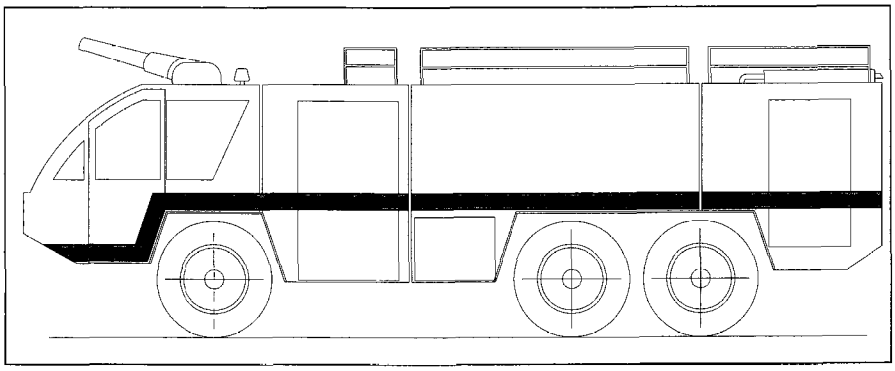

Figure 3: Suggested location for the horizontal reflective band, Option 3

(6) TLTVs. Retroreflective tape is used to outline the shape of a TLTV. If the vertical edge of the vehicle is rounded, the tape should be placed on the rounded portion to reflect light in both the horizontal and vertical planes. Where the placement of the tape may interfere with, or may be worn down by, maintenance or operational activities, tape is not required. Suggested locations for the retroreflective bands are shown in Figure 4

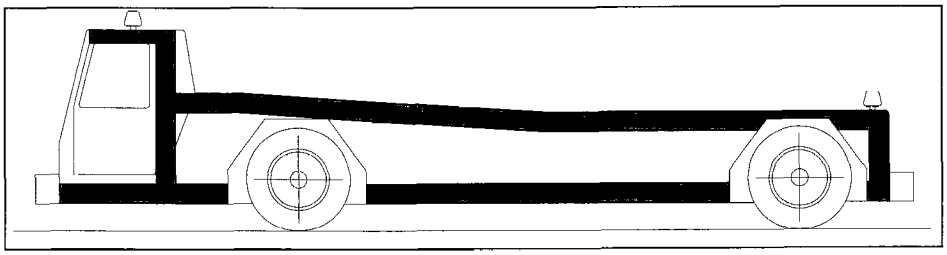

Figure 4: Suggested placement of retroreflective tape on a TLTV

d. Airport Security and Other Vehicles.

(1) Vehicles other than those that routinely traverse any portion of the AOA under the control of ATC, which are not escorted by a vehicle in constant two-way radio communication with ATC and properly equipped and authorized to operate in the AOA, must be provided with a flag on a staff attached to the vehicle so that the flag will be readily visible

(2) At airports without air traffic control facilities, flags must be provided on all vehicles.

(3) The flag must be at least a 3-foot by 3-foot (0.9 meter by 0 9 meter) square having a checkered pattern of international orange and white squares at least 1 foot (300 mm) on each side (see Appendix A for the fabric color specification).

5. VEHICLE LIGHTING.

a. Airfield Service, Aircraft Support, and Airport Operations Vehicles.

(1) The standard for identification lighting is a yellow flashing light that is mounted on the uppermost part of the vehicle structure A steady yellow light designates vehicles limited to non-movement areas.

(2) The light must be visible from any direction, day and night, including from the air.

(3) Color specifications for vehicle identification lights are per Appendix B

(4) **TLTVs.** An LED light bar placed above the operator's cab may be used in place of the rotating yellow flashing light. In addition, a yellow flashing light (of any type) must be installed on the upper left-rear and right-rear corners of the TLTV, and must be activated when an aircraft is in tow. The size of the rear flashing lights must be large enough to meet the requirements of Section 5 c, but not so large as to interfere with the normal or towing operations of the TLTV.

b. Airport Emergency, Security, and Other Vehicles, which are not escorted by a properly lighted vehicle, must be identified during periods of low visibility by a light

c. Characteristics of Flashing Lights:

(1) Ambulance lights must meet the specifications in the most current version of Federal Specification KKK-A-1822, and ARFF vehicles must meet NFPA, state, and local requirements.

(2) Lights must have peak intensity within the range of 40 to 400 candelas (effective) from 0° (horizontal) up to 10° above the horizontal and for 360° horizontally. The upper limit of 400 candelas (effective) is necessary to avoid damage to night vision.

(3) From 10° to 15° above the horizontal plane, the light output must be $1/10^{th}$ of peak intensity or between 4 and 40 candelas (effective)

(4) Lights must flash at 75 ± 15 flashes per minute.

NOTES:

1 The effective intensity of a flashing light is equal to the intensity of a steady-burning (fixed) light of the same color that produces the same visual range under identical conditions of observation

2. If xenon flashtubes are used, refer to AC 150/5345-43, Specification for Obstruction Lighting Equipment, for guidance concerning methods of calculating effective intensity

d. Light Colors.

(1) Airport Emergency Vehicles.

(a) **Ambulances.** Per the most current version of Federal Specification KKK-A-1822.

(b) **ARFF Vehicles.** Red or a combination of red-and-white flashing lights per the chromaticity requirements in Appendix B.

(2) Airport Security Vehicles. Signal blue or a combination of red and signal blue flashing light per the chromaticity requirements in Appendix B

(3) Airfield Service, Aircraft Support, Airport Operations, and Other Vehicles. Yellow flashing light per the chromaticity requirements in Appendix B.

APPENDIX A. COLOR SPECIFICATIONS

A-1. SPECIFICATIONS. Colors specified in Table A-1 are per the Commission Internationale de l'Eclairage (CIE) L*a*b* system of color specification. For a description of this system, refer to American Society for Testing & Materials (ASTM) D 2244, *Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates*

Table A-1. Specification for vehicle and flag colors

Standard Illuminant D65 Usage	Chrome Yellow			Yellowish-Green			International Orange		
	Vehicle Paint			Vehicle Paint			Vehicle Paint / Flag Fabric		
CIELAB DATA	**L***	**a***	**b***	**L***	**a***	**b***	**L***	**a***	**b***
Centroid Color	72.8	24 4	77 6	78.3	-10.2	80 4	45.0	53 5	52.0
Point 1	72 8	31 8	82.9	78.3	-9.0	92 0	45.0	61 4	47.8
Point 2	72.8	25 5	66.7	78.3	-7.6	73 2	45.0	53.9	41.4
Point 3	72 8	18.0	69.3	78 3	-11.0	69 3	45.0	53.5	53.4
Point 4	72 8	22.4	86 0	78 3	-13.4	86 2	45.0	49.7	60 4
Light Limit	77.8			83.3			49 9		
Dark Limit	67.8			73.3			41 6		
Max ΔE	11 1			11.7			10.7		

A-2. COLOR TESTS. Acceptable colors are those that meet the gloss rating test and either a visual or an instrumental color test as follows:

NOTE: *Flag fabric colors must meet either the instrumental tests in Table A-1 or the visual method described in paragraph A-2b(1)*

a. Gloss Rating Test. This test is performed per ASTM D 523, *Standard Test Method for Specular Gloss,* on a paint sample of the color to be applied on the vehicle. An acceptable color sample is high gloss with a minimum gloss rating of 70 units, for 60° geometry.

b. Color Test Methods:

(1) Visual. Prepare a master specimen of the color (per Table A-1) and gloss (per paragraph A-2a). This specimen will be the master color and be used as the basis of comparison per ASTM D 5531-05, *Standard Guide for the Preparation, Maintenance, and Distribution of Physical Product Standards for Color and Geometric Appearance of Coatings* To verify the paint color of a vehicle visually, vehicle paint samples must be

prepared and viewed per ASTM D 1729-96 (Reapproved 2009), *Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials*

(2) Instrumental. This test requires a test specimen sample and reference to Table A-1 All test specimen measurements should be conducted per ASTM E 1164-09a *Standard Practice for Obtaining Spectrometric Data for Object-Color Evaluation* Test specimen tolerances must be per Table A-1 per the following:

(a) Plot the centroid color using the a* and b* CIELAB coordinate data from Table A-1 on graph paper or by entry of the coordinate data into a computer program. Plot and connect points 1 through 4 from the same table to form a quadrilateral, noting that the centroid color is within this figure. See Figure A-1 for plots of all three color specifications in Table A-1.

(b) Perform color sample measurements per ASTM E 1164-09a If necessary, convert measurements to CIELAB L*, a*, and b* color space. See ASTM E 308-08, *Standard Practice for Computing the Colors of Objects by Using the CIE System,* for color space conversion formulae

(c) An acceptable color is one that meets:

(i) the chromaticity requirements of the color samples a* and b* CIELAB coordinate data by falling within the quadrilateral;

(ii) the L* data lightness requirement by falling within the range defined by the light and dark data of Table A-1,

(iii) the total color difference (ΔE) by not exceeding the limits in Table A-1 when the CIELAB data are computed in the following formula:

$$\Delta E = (\Delta L^{*2} + \Delta a^{*2} + \Delta b^{*2})^{\frac{1}{2}}$$

where ΔL*, Δa*, and Δb* values are the differences between those values for the centroid color in Table A-1 and those of the color sample measurements.

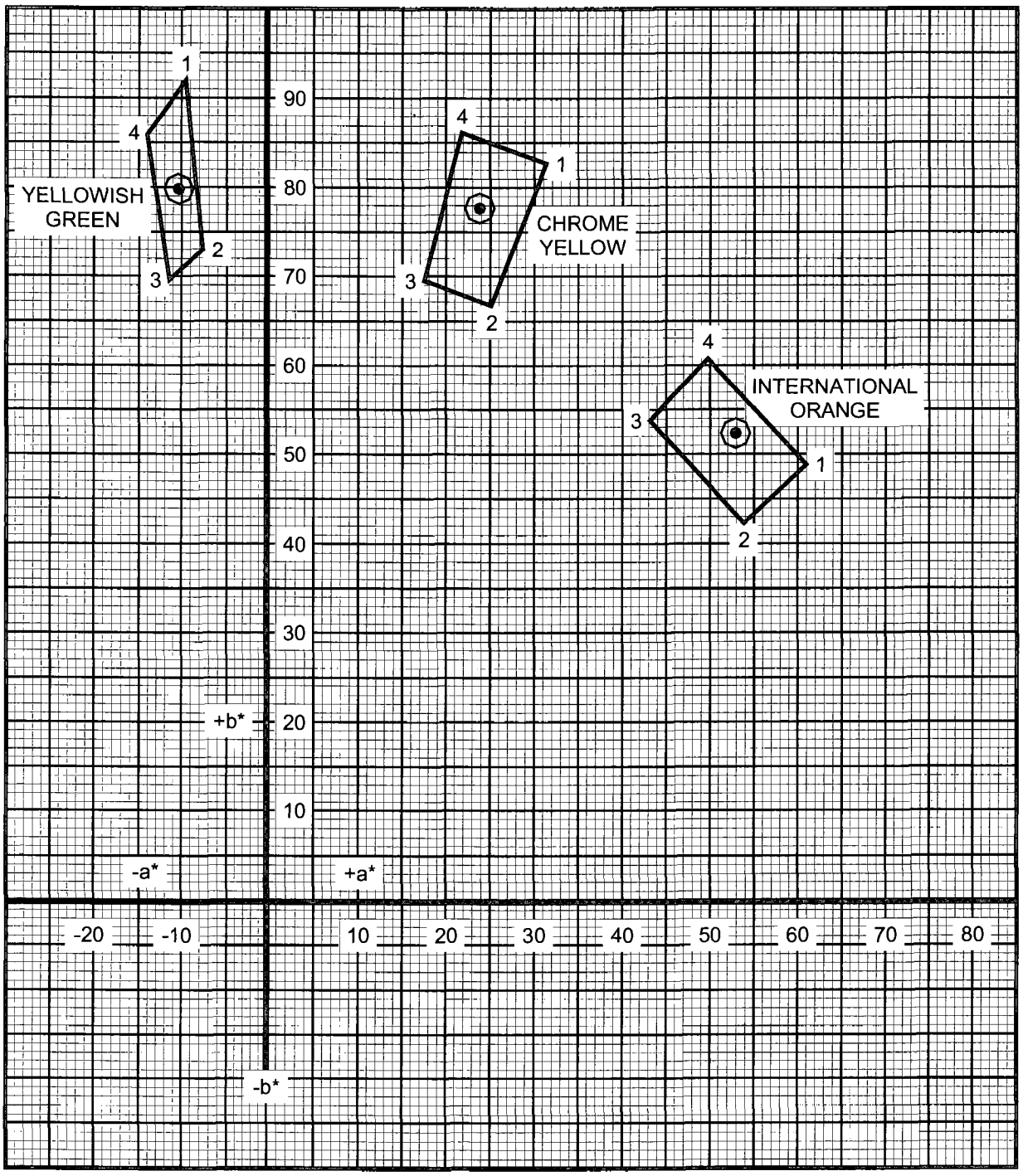

Figure A-1. Plot of selected color paint specifications

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APPENDIX B. COLOR SPECIFICATIONS FOR VEHICLE IDENTIFICATION LIGHTS

B-1. SPECIFICATIONS. The Society of Automotive Engineers (SAE) Standard J578 Revised December 2006, *Color Specification*, defines the acceptable color boundary limits and measurement of emitted red, white, signal blue, and yellow light for vehicle lights. This standard applies to the overall emitted color of light from the device in lieu of emitted light from any small area of the lens. The color of emitted light must fall within the color boundaries per SAE J578 Revised December 2006 (color boundary equations are in the standard) using color measurement methods detailed in the standard See FAA Engineering Brief #67, Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures, for additional information and Alternative Lighting Devices.

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Consolidated AC includes Change 1

U S Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: Standards for Airport Markings

Date: 9/3/2010
Initiated by: AAS-100

AC No: 150/5340-1K
Change:

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

2. **CANCELLATION.** This AC cancels AC 150/5340-1J, Standards for Airport Markings, dated April 29, 2005, and subsequent changes, dated March 31, 2008, and June 6, 2008. This AC also cancels the Signs and Marking Supplement (SAMS)

3. **APPLICATION.** 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 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. **NATIONAL TRANSPORTATION SAFETY BOARD SAFETY RECOMMENDATION.** The National Transportation Safety Board (NTSB) in response to pilots landing on taxiways adjacent to runways, requested that the FAA conduct research and development to identify visual aid enhancement solutions for use with taxiways that experience repeated taxiway landing problems (reference: Item A-04-49 of NTSB Safety Recommendation letter, dated June 25, 2004)

a. Results. The FAA evaluated the non-standard surface markings requested by NTSB, namely an enlarged, reoriented surface paint "A" taxiway location sign, a serpentine marking running along the taxiway centerline, and the inscriptions "TAXIWAY" and "TAXI ONLY." The investigation determined that all proposals had some deficiencies. For example, serpentine markings were found not to be significantly visible from the air The smaller, length inscription "TAXI" by itself in the phrase "TAXI ONLY" was sufficient to perform the same intended task. See report DOT/FAA/AR-TN 07/54, Identification Techniques to Reduce Confusion Between Taxiways and Adjacent Runways, for details. See paragraph 5 16 of this advisory circular for the usage of the non-standard marking "TAXI."

b. Other Observations. The report further concluded "...that airport geometry is a major causal factor in such incidents . ." One rectifying solution for troublesome airport geometry was the use of green-colored aviation grade artificial turf that would visually change the shape of the taxiway environment. One application is masking the squared paved corner of the entrance taxiway so that it creates the effect of a curved taxiway, i.e , minimize its visual size in comparison to the squared runway end. See paragraph 5.16 of this advisory circular for additional information. AC 150/5370-15, Airside

Applications for Artificial Turf, latest edition, provides guidance for the use of aviation grade artificial turf in areas adjacent to the operational areas of the airport. This solution is not for runway environment applications because: "Sufficient data are not available on the performance of artificial turf in the case of high-speed veer offs..." (see paragraph 5 of AC 150/5370-15A).

5. EXPLANATION OF PRINCIPAL CHANGES. This AC incorporates new surface marking criteria, extensive text and format changes, and new and revised figures, as described below

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

- Green (Painting) – explains painting precautions and solutions, such as when proportioning is permissible for runway surface markings.
- Red (Safety) – emphasizes safety initiatives.
- Gray (General) – contains general remarks.

b. Incorporates all applicable surface marking supplements from SAMS.

c. Adds new definitions (paragraph 1.2)

d. Adds a new subparagraph, "Painted Numbering System for Record Keeping of Surface Painted Markings" (paragraph 1.3(f)). This practice was added to assist airport operators in identifying surface markings in their Sign Plan needing maintenance, scheduling painting, etc.

e. Adds new table 1-1 that provides general guidelines for determining when to add black borders to light-colored pavements (paragraph 1.4)

f. Adds a new warning box about dispensing glass beads during painting applications and, in particular, when painting surface painted holding position signs (paragraph 1.4(b)).

g. Revises table 2-1 criteria (paragraph 2 1)

h. Deletes all text related to the former FAA threshold marking scheme. This revision adopts the standards and recommended practices contained in International Civil Aviation Organization (ICAO) Annex 14, Volume I, Aerodrome Design and Operations Adds new table 2-2, which shows the number of symmetrical runway threshold stripes required for standard runway widths and new text for painting non-standard runway widths (paragraph 2.5(d)).

i. Adds new text to emphasize the co-located relationship between the aiming point marking and PAPI and other NAVAIDs (paragraphs 2 2 and 2 6)

j. Adds new criteria for the width of and separation between aiming point markings for various standard runway widths (paragraph 2.6(d)).

k. Adds new table 2-3 and new text for table 2-4 about painting touchdown zone markings for runway ends having single or dual precision approaches (paragraph 2.7).

l. Clarifies text for marking runways with and without aligned taxiways (paragraph 2 9).

m. Adds Engineered Materials Arresting System (EMAS) to blast pads and stopways as facilities to be marked with chevrons (paragraph 2 10) Adds new painting criteria for stopways for Airplane Design Group I – exclusively small airplane runways (paragraph 2.10(d)).

n. Includes a new Chapter 3 that consolidates the six different applications of holding position markings and different painting schemes, with a new pattern designation, i.e., Pattern A, B, and C surface markings for holding positions The pattern designation is more in line with the standards and recommended practices contained in ICAO Annex 14, Volume I.

o. Adds new and revised text for painting the enhanced taxiway centerline marking (paragraph 4.3)

p. Adds new criteria for painting NO-TAXI islands with continuous taxiway edge markings for wide taxiway entrances (paragraph 4.4) as a means to reduce runway incursions.

q. Adds new criteria and revised text for surface painted holding position signs (paragraph 4.5). The new criteria apply to Airplane Design Groups I and II, requiring a single surface painted holding position sign centered on the taxiway centerline instead of a single surface painted holding position sign to the left of centerline or dual surface painted holding position signs (paragraph 4.5(b)(4) and new figure C-15).

r. Adds a new 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" (paragraph 4.5).

s. Adds new criteria for the minimum height of surface painted holding position signs for Airplane Design Groups III – VI and for Airplane Design Groups I – II (paragraph 4.5(d) and figures C-5, C-6, C-7, and C-8)

t. Adds a new green-colored box explaining when to stack surface painted holding position signs on narrow taxiways widths (paragraph 4.5(d) and new figure C-15).

u. Adds new and revised text about the geographic position marking (paragraph 4.11).

v. Drops a proposed new surface marking for areas designated by the Transportation Security Administration (TSA) and the airport operator as a security identification display area (SIDA) (reassigned paragraph 5 15 to cover markings for aircraft deicing facilities and removed proposed figure C-14). TSA accepted the task to address future markings for the airside.

w. Adds a new paragraph 5.15, "Aircraft Deicing Facility Markings," to reference markings for aircraft deicing facilities in accordance with AC 150/5300-14, Design of Aircraft Deicing Facilities.

x. Adds new paragraph 5.16, Interim Surface Markings for Taxiways Mistaken as Runways, in response to NTSB Safety Letter.

y. Revises figures 1 and 2 to show only one threshold marking scheme (formerly referred to as Configuration B) and drops painting method Configuration A per paragraph 2.5. The single marking scheme conforms with ICAO Annex 14, Volume I

z. Adds new text to figure 8 emphasizing that the width of a stopway only equals the runway width, but the width of a blast pad includes both the runway width and the shoulders.

aa. Adds new figure 12a showing that the Pattern B application for POFZ holding position marking differs from the ILS/MLS holding position marking by turning 90 degrees on certain taxiway or holding bay geometries.

bb. Adds new figures C-2 and C-3 from SAMS.

cc. All 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 provided in MS Word or Adobe Reader. 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. COMPLIANCE DATES FOR SPECIFIC SURFACE PAINTED MARKINGS FOR 14 CODE OF FEDERAL REGULATION (CFR) PART 139 CERTIFICATED AIRPORTS. The compliance dates for the enhanced taxiway centerline marking and the surface painted holding position sign are found within the red-coded Safety Boxes in paragraphs 4.3(a) and 4.5(a), respectively. See these paragraphs for the applicable compliance dates.

7. METRIC UNITS. To promote an orderly transition to metric units, the text and figures include both English and metric dimensions. The metric conversions are based on operational significance and may not be exact equivalents of the English dimensions Until there is an official changeover to the metric system, the English dimensions govern.

8. ADVISORY CIRCULAR (AC) AND ORDER REFERENCES. All references to FAA ACs and Orders are to the most recent versions, which are available from the FAA website at http://www.faa.gov

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: All figures in this AC are reduced versions of DWG files compatible with MS Word Use the zoom feature in MS Word or Adobe Reader to view detail in any figure

1.2. DEFINITIONS. The following definitions apply to terms used in this AC.

a. Certificated 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. 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).

e. Non-precision Runway. A runway end having an instrument approach procedure that provides course guidance without vertical path guidance See Appendix 16, New Instrument Approach Procedures, in AC 150/5300-13, Airport Design, for additional information.

f. Precision Runway. 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.

g. 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 "Displaced Threshold").

h. 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. 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 – 30 mils in dry thickness.

b. 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.

c. 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.

d. 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.

e. Removal of Markings. Pavement markings that are no longer needed are not to be painted over but instead are to be physically removed. 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 FAA does not endorse painting over the old markings because this practice merely preserves the old marking, which in some cases have misled pilots, and requires additional maintenance. ***Precaution:*** Special consideration should be placed on the size and shape of removal areas when removing runway markings associated with the relocation of a runway threshold or its displacement so that the resulting area of discolored pavement resulting from the removal process does not result in the continued visual appearance of a marked pavement. That is, the size and shape of the removal area(s) need to be much larger than the marking to be removed.

f. 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 1-1 shows a numbering system adopted by Dallas/Fort Worth (DFW) International 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

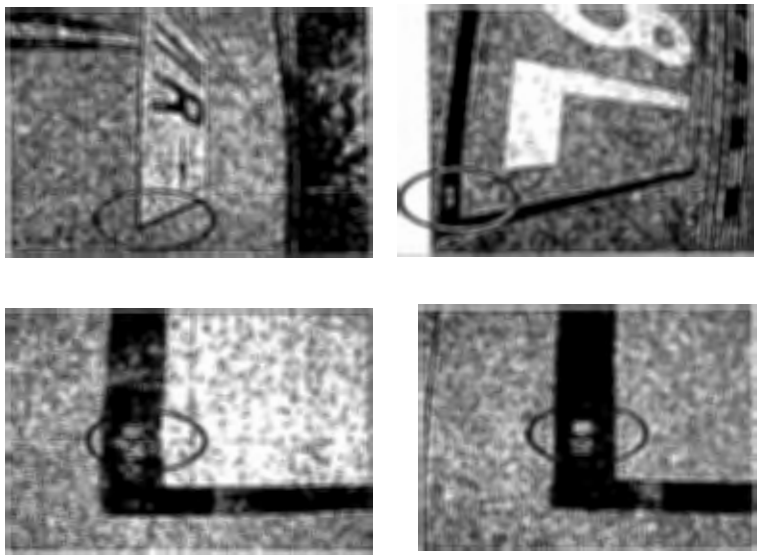

Figure 1-1. Example of DFW Painted Numbering System for Surface Painted Markings

1.4. REQUIREMENTS AND RECOMMENDATIONS FOR ENHANCED CONSPICUITY OF SURFACE MARKINGS. Surface markings that cannot be seen by pilots and other individuals operating on paved airfield surfaces are useless. Two proven techniques that help airport operators enhance the conspicuity of surface markings are (1) outlining surface markings with black borders on light-colored pavements and (2) placing glass beads in paint. However, glass beads are not to be used in black paint. 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 Surfaces	**Yes**	**Yes**	**Yes**
Asphalt Concrete Surfaces	**No**	**No**	**Yes**
Asphalt Treated Surfaces	**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 Light-Colored Pavements. The degree of contrast (conspicuity) between surface markings on light-color pavements, in particular on concrete 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, should be at least 6 inches (15 cm) or greater in width to enhance the conspicuity of certain painted surface markings on light-color pavements. The borders for the outside dashes of the enhanced taxiway centerline marking can range from 3 to 6 inches (7.5 – 15 cm).

(1) Surface Markings that Require Black Borders.

(i) All holding position markings used on runways, taxiways, and holding bays and used to indicate ILS/MLS or precision obstacle free zone (POFZ) critical areas (per paragraphs 3.2, 3.3, 3 4, and 3.5) and the non-movement area boundary marking (per paragraph 5.4).

(ii) Intermediate holding position marking for taxiway/taxiway intersections (per paragraph 3.6).

(iii) All taxiway centerline markings on taxi routes designated as surface movement guidance and control system (SMGCS) routes (per paragraph 4.2).

(iv) Enhanced taxiway centerline marking (per paragraph 4.3).

(v) Surface painted holding position sign marking (per paragraph 4.5).

(vi) 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 in paragraph 1.4(a)(1), particularly taxiway centerlines per paragraph 4.2

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. 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 methylacrylate, or preformed thermoplastic. ***Precaution:*** As previously stated, glass beads should never be used in black paint

Glass Bead Requirement **Paragraph 620-3.5, *Application,* per AC 150/5370-10** **(General)**
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 Table 1 of AC 150/5370-10. Glass beads shall not be applied to black paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made.

(1) Surface Markings that Require Glass Beads.

(i) All holding position markings used on runways, taxiways, and holding bays and used to indicate ILS/MLS or POFZ critical areas (per paragraphs 3 2, 3.3, 3.4, and 3.5).

(ii) Runway threshold marking (per paragraph 2.5).

(iii) Runway threshold bar marking (per paragraph 2 9(a)).

(iv) Runway aiming point marking (per paragraph 2.6)

(v) Runway landing designator marking (per paragraph 2.3).

(vi) Runway touchdown zone marking (per paragraph 2.7).

(vii) Runway centerline marking (per paragraph 2.4).

(viii) Taxiway centerline marking (per paragraph 4 2).

(ix) Enhanced taxiway centerline marking (per paragraph 4.3).

(x) Geographic position marking (per paragraph 4.11).

(xi) Surface painted signs for holding position signs (paragraph 4.5), taxiway direction signs (paragraph 4.6), taxiway location signs (paragraph 4 7), gate destination signs (paragraph 4.8), and apron entrance point signs (paragraph 4.9)

(xii) Non-movement area boundary marking (per paragraph 5 4)

(2) Surface Markings Recommended for Glass Beads.

(i) Runway side stripe marking (per paragraph 2.8)

(ii) Taxiway edge marking (per paragraph 4.4).

(iii) Runway displaced threshold marking (per paragraph 2.9)

(iv) Runway demarcation bar marking (per paragraph 2.9(c)).

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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 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. Figures 1, 2, 3, and 5 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 side stripes 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

	Threshold Approach Category		
Runway Surface Marking Scheme	**Visual Approach**	**Non-precision Approach (Approaches with vertical guidance not lower than ¾ -statute mile visibility)**	**Precision Approach (Approaches with vertical guidance lower than ¾ -statute mile visibility)**
Landing Designator (par. 2.3)	X	X	X
Centerline (par. 2 4)	X	X	X
Threshold (par. 2.5)	Note 1	X	X
Aiming Point (par. 2.6)	Note 2	Note 3	X
Touchdown Zone (par. 2.7)			X
Side Stripes (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 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 side stripes (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 4, the most affected surface markings are the runway centerline, runway side stripes, 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 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 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 paragraph 7.5, Design (of Economy Approach Aids) and table 7.1, Threshold Crossing Heights, of 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. This undesirable geometry requires a special shifting procedure of the runway landing designator marking of the lesser precedence runway further 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.

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. Location. Runway landing designator marking(s) must be located from the runway threshold per figures 1, 2, and 3 or from the displaced threshold per figure 6. All these figures show the start location for both types of thresholds.

c. Color. Runway landing designator markings are white. See paragraph 1 4, *Requirements and Recommendations for Enhanced Conspicuity of Surface Markings*, for required and recommended techniques to enhance visibility of this surface marking.

d. Characteristics.

(1) A runway landing designator marking consists of a single number or two numbers. When parallel runways exist, the number(s) are 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 can 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 subparagraph 2.3(d)(6)

(i) Two parallel runways having a magnetic azimuth of 182 degrees – the runways would be designated "18L," "18R."

(ii) Three parallel runways having a magnetic azimuth of 87 degrees – the runways would be designated "9L," "9C," "9R "

(iii) Four parallel runways having a magnetic azimuth of 324 degrees – the runways would be designated "32L," "32R," "33L," "33R "

(iv) Five parallel runways having a magnetic azimuth of 138 degrees – the runways would be designated "13L," "13R," "14L," "14C," "14R" or "14L," "14R," "13L," "13C," "13R." Other combinations exist for this case See paragraph 2.3(d)(6).

(v) Six parallel runways having a magnetic azimuth of 83 degrees – the runways would be designated "8L," "8C," "8R," "9L," "9C," "9R." Other combinations exist for this case See paragraph 2 3(d)(6).

(vi) Seven parallel runways having a magnetic azimuth of 85 degrees – the runways would be designated "8L," "8C," "8R," "9L," "9C," "9R," "10." Other combinations exist for this case. See paragraph 2.3(d)(6).

(6) There are certain runway placements where the surface marking schemes for parallel runways provided in subparagraph 2.3(d)(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 subparagraph 2 3(d)(5). However, when two parallel runways are separated by a large 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

(7) The appearance of the letters and numbers used for runway landing designator markings are in the form and proportion as shown in figure 5. The spacing between numbers and letters are as shown in figures 1, 2, 3, and 5. 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 figures 1, 2, and 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 side stripes. 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 5. 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 side stripe 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. 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 figures 1, 2, and 3.

c. Color. The runway centerline marking is white. See paragraph 1 4 for required and recommended techniques to enhance this surface marking.

d. 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, which commences 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. Location. The runway threshold marking starts 20 feet (6 m) from the actual start point of the runway threshold as shown in figures 1 and 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 8. 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 a runway is completely remarked, the newly painted displaced threshold and threshold bar markings are 10 feet (3 m) apart as shown in figure 6.

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

d. 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 1 illustrates the pattern for a 150-foot (45-m) wide runway. See paragraph 2.5(d)(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 1 illustrates the stripe-gap pattern for 150-foot (46 m) wide runways. The stripe-gap pattern allows sufficient room to paint runway side stripes 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 side stripes, 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. Location. The *preferred* beginning of the aiming point marking starts 1,020 feet (311 m) from the runway threshold as shown in figures 1, 2, and 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 table 7-1, *Threshold Crossing Heights*, of 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 4 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 paragraph 7.5, *Design (of Economy Approach Aids)* and table 7-1, *Threshold Crossing Heights*, of 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).

c. Color. The runway aiming point marking is white See paragraph 1.4 for required and recommended techniques to enhance this surface marking.

d. 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 (1,280 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 figures 1, 2, and 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 x 0.467 = 33 6 feet (10 25 m) between the pair and an individual width of 30 x 0.467 = 14 feet (4.27 m) If runway side stripes are also painted, which are not reduced, then the adjustment should add the width of the corresponding runway side stripes plus a minimum 1-foot (0.3-m) clearance between the outer edge of the aiming point marking and the runway side stripe. **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.

a. 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 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. Pairs 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 pair of rectangular bar markings[2]	Aiming point marking
5,065 ft (1544 m) to 5,564 ft (1696 m)	Less two pairs of rectangular bar markings	Aiming point marking
4,565 ft (1391 m) to 5,064 ft (1543 m)	Less three pairs of rectangular bar markings	Aiming point marking

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(d)(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. Summing the values 3,995 and 2,070 yields 6,065 feet.

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

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.

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. Pairs 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 pair 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 pairs 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 pairs of rectangular bars from each side nearest to the runway midpoint[2]

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.

Note 2: Each reduction in a pair of rectangular bar markings from both sides equates to a 1,000-foot (305-m) reduction between the thresholds.

The painting rationale for this table is to preserve the midpoint between the thresholds, thereby promoting an equal treatment of painting pairs of rectangular bar markings for both sides

(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.

c. Color. All rectangular bars are white. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. 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(d)(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 non-standard 70-foot wide runway would apply 70/150 = 0 467 to obtain a lateral spacing for the centered pair of 72 x 0.467 = 33.6 feet (10.25 m), a lateral spacing for other pairs of 5 x 0.467 = 2.3 ft (0 7 m), and a width of 6 feet x 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 side stripes 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 further out from the runway centerline than the aiming point marking.

2.8. RUNWAY SIDE STRIPE MARKING.

a. Purpose. The runway side stripe 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. Location. The runway side stripe 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 1 illustrates the runway side stripe marking.

c. Color. The stripes of the runway side stripe marking are white. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. Characteristics. The runway side stripe 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 side stripes continue through the paved area prior to the displaced threshold as shown in figure 6. This continuation of the side stripes 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 figures 7 and 9, precedes a runway threshold, both side stripes will terminate. The point of termination of the side stripes is determined by the taxiway geometry. The FAA recommends that airport operators not construct new aligned taxiways The FAA further recommends that existing aligned taxiways be removed or reconfigured into usable runways, for example, as shown in figures 6 and 10

(3) When a taxiway connects to a runway or the runway has turn pads or turnarounds, the runway side stripe marking remains continuous between the runway and these adjoining infrastructures.

(4) For intersecting runways, see guidance in paragraph 2 2, *Interruption of Runway Surface Markings.*

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 Figures 6, 9, and 10 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.

(2) 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 6.

(3) Color. The runway threshold bar marking is white. See paragraph 1 4 for required and recommended techniques to enhance this marking.

(4) Characteristics. The runway threshold bar marking is 10 feet (3 1 m) in width and extends between the runway edges or between the runway side stripe 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 6 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 9 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 7 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
Airport operators should avoid the (1) conversion of a runway section into an aligned taxiway and (2) construction of a new aligned taxiway

(2) 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

(3) Colors.

(i) For the predominate 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.

(4) Characteristics. The dimensions and spacing requirements for arrow shafts and arrowheads are as shown in figure 6 (function one), figure 7 (function two), and figure 9 (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) 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 10 In another application, as shown in figure 9, the portion of ***aligned taxiway*** before the demarcation bar is not part of the usable runway.

(3) Color. The demarcation bar marking is yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

(4) 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 for Aircraft Overruns.

b. 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 figures 8 and 10. The chevron scheme for an EMAS installation is also centered along the extended runway centerline (not shown in figures 8 and 10)

c. Color. Chevron markings are yellow See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. 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 8. 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 used exclusive by small airplanes (Airplane Design Group I – 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 8 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 side stripe marking.

b. Location. The runway shoulder marking is located between the runway side stripe and the outer edge of the paved shoulder as shown in figure 11.

c. Color. Runway shoulder markings are yellow. See paragraph 1.4 for required and recommended techniques to enhance this marking.

d. 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 11

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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. Figures 12 and 12a 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 12, 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, Design and Installation Details for Airport Visual Aids.

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: Paragraph 405, *Parallel Taxiway,* of AC 150/5300-13 states that a *basic airport* consists of a runway with a full-length parallel taxiway. 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 location of the runway holding position marking is at or beyond the edge of the runway safety area of the intersecting runway as provided by AC 150/5300-13. 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 runway safety 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 table 2-1 or table 2-2 in AC 150/5300-13 for the intersecting runway's airport reference 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 table 2-1 or table 2-2 in AC 150/5300-13 for the intersecting runway's airport reference 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 subparagraph 3.2(b)(2)(ii). In no case should the location of the predetermined hold-short point be within the holdline criteria in table 2-1 or table 2-2 in AC 150/5300-13 for the intersecting runway's airport reference code.

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 accompanying necessary signage) in accordance with the applicable holdline criterion One such geometry occurs when a crossing taxiway or its fillet intersects the same area indicated by table 2-1 or table 2-2 of AC 150/5300-13. One solution is to move the hold-short point further 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

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 12, 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 12. The solid lines, as compared to the dash 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 further 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 12 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 C-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 table 2-1 or table 2-2 in AC 150/5300-13 for the runway's airport reference code. Since 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 figures 4-8 and 4-9 of 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 table 2-1 or table 2-2 in AC 150/5300-13 for the runway's airport reference code or the boundary of the approach surface's critical area. The Pattern A marking must extend across the entire width of the taxiway. 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.

(3) The Pattern A marking must extend across the entire width of the taxiway. For taxiways having taxiway edge markings, discontinue the taxiway edge marking as shown in figure 21 so that the Pattern A marking continues to the edge of the defined taxiway width. For taxiways 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 C-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 viewing angle minus (1/2)(75) standard taxiway width equals 25 feet] onto the paved taxiway shoulders. Only those taxiway entrances to a runway 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

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports Runway Incursion Mitigation Requirement (Safety)
The extended runway holding position marking, as illustrated in figure C-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. Since the compliance date of June 30, 2008, has passed, all new taxiway entrances serving ADGs V and VI airplanes must be painted accordingly prior to opening the taxiway. 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 12, 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. 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, run the width of the paved taxiway, measure 12 inches (30 cm) in width, and are separated as shown in figure 12. 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.

(1) 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.

(2) Pattern A is painted perpendicular to the taxiway centerline but may be canted from the perpendicular in unique situations, such as an extremely acute, angled taxiway. For such unique 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.

(3) Pattern A on converging taxiways as shown in figure C-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

(4) For taxiways with taxiway edge markings, the taxiway edge markings must be removed for the width of the Pattern A marking.

(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

(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.

(5) For ADGs V and VI taxiways 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 C-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

(6) For ADGs V and VI taxiways 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 C-4, 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 12 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.

(1) Where the distance between an ILS/MLS holding position (Pattern B) marking and the runway holding position (Pattern A) marking on a taxiway is 50 feet (15 m) or less, paint only one pattern, provided it will not adversely affect capacity. In this case, it is preferable to move the runway holding position (Pattern A) marking back to the where the ILS/MLS holding position (Pattern B) would have been painted. This preference is selected for taxiways serving ADG V or ADG VI airplanes in which the marking is extended onto the taxiway shoulders.

(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 12a), 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 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 See AC 150/5300-13 for general information about the ILS/MLS and POFZ critical areas

(4) The Pattern B marking for ILS/MLS applications must extend across the entire width of the taxiway or holding bay as shown in figure 12.

c. Color. The Pattern B marking scheme as shown in figure 12 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 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) (see Figure 12). Figure 12 provides the discontinuation (separation) of an ILS/MLS holding position marking with an intersecting taxiway centerline or taxiway edge stripe markings. 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.

3.5. 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 12a 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 ¾-statue 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.

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 15 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 figures 12a and 15.

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) Figure 12, 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 stripe markings. Figure 15 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 12a 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 14 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 table 2-3 of AC 150/5300-13 for the most demanding airplane design group serving the airport (as defined 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 12a and figure B-7. The single dash lines are 1 foot (0.3 m) wide, 3 feet (0.9 m) long, and spaced 3 feet (0.9 m) apart As shown in figure 12a, all intersecting taxiway centerlines are spaced 6 to 12 inches (15 cm to 30 cm) on either side of this marking.

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 marking 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. All taxiways regardless of their width have a surface painted taxiway centerline.

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. 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 as the Radius of Taxiway Turn in table 4-2 of 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 16. The recommended 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—that is, judgmental over-steering is performed by pilots—the centerline marking continues straight through the intersection as shown at the top of figure 16 This practice applies to intersecting taxiways that are or are not of the same airport reference code

(ii) Where adequate fillets exist, that is, the fillets are designed to the most demanding aircraft, the taxiway centerline marking follows the taxiway curve as shown on the bottom of figure 16 to permit cockpit-over-centerline steering operations This practice applies to intersecting taxiways that are or are not of the same airport reference code.

> **Note:** AC 150/5300-13 states that cockpit-over-centerline steering as compared to judgmental over-steering is the preferred methodology for painting taxiway centerlines in taxiway intersections. To reduce taxiway excursions on turns, airport operators are encouraged to (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 figures 14 and 15, the taxiway centerline is terminated either at the runway edge or at the outer edge of the runway side stripe. However, the taxiway centerline (lead-on and lead-off) will continue onto the runway under the following conditions

(1) Where there is a displaced threshold, as shown in figures 6 and 10, 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 6 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(b)(2)(i)(2))

(2) 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 14, 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 figures 14 and 15, these lead-on and lead-off taxiway centerlines are 3 feet (1.0 m) from the runway centerline when measured near-edge to near-edge

(1) 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(b)(2)(ii)(2).

(2) 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.

c. 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 non-movement area, taxiway/taxilane centerlines are painted in accordance with AC 150/5300-14, Design of Aircraft Deicing Facilities.

d. 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) Airport operators may, if deemed necessary to provide pilots a better visual clue of the location of troublesome taxiway exits from the runway, 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 (the taxiway connects to a runway), (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). Figures 12 and 12a 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 C-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, such as, a taxiway through an approach area.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports Runway Incursion Mitigation Requirement (Safety)
The enhanced taxiway centerline marking, as illustrated in figure C-1, is mandatory and the only acceptable means of compliance for all 14 CFR Part 139 certificated airports. All entrance taxiways with a runway holding position marking are to have the enhanced taxiway centerline marking. Painting this safety enhancement should be completed in the shortest period of time, preferably concurrently for all taxiway entrances to a given runway. The intent of this revision is to avoid pilot confusion by eliminating the previous three different applications of this safety enhancement at 14 CFR Part 139 certificated airports. Compliance dates vary as follows· (1) for commercial service airports with annual passenger enplanements of 1 5 million or more, June 30, 2008 Beyond this deadline, all new taxiway entrances must be painted accordingly prior to opening the taxiway; (2) for commercial service airports with less than 1.5 million annual passenger enplanements but more than 370,000 annual passenger enplanements, December 31, 2009. Beyond this deadline, all new taxiway entrances must be painted accordingly prior to opening the taxiway; and (3) for all other commercial service airports and non commercial service airports certificated under 14 CFR Part 139, December 31, 2010. Beyond this deadline, all new taxiway entrances must be painted accordingly prior to opening the taxiway 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 C-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. If a black border is required, the border on the outside of the dashes can be 3 to 6 inches (7 5 – 15 cm) in width. All black borders never use glass beads

d. Characteristics. The standard painted enhanced taxiway centerline marking consists of two parallel lines of yellow dashes one on each side of the existing taxiway centerline as shown in figures C-1 and C-6. For both applications, the first dashes start 6 to 12 inches (15–30 cm) from the runway holding position marking. For figure C-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 C-6 applications, the first and second set of dashes are 6 to 12 inches (15 - 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 C-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 C-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 C-16 illustrates situations in which one enhancement is fully painted, one enhancement terminates at the outer edge of the runway side stripe, and the other enhancements terminate at the edge of the runway (figure C-16 uses an unpainted reference line to terminate the enhancements to Runway 1/19).

(2) Taxiway/Taxiway Intersections and Merging Intersections. Figures C-11 (Note 2), C-12 (Note 1), and C-14 illustrate that if the taxiway centerline to be enhanced intersects another straight taxiway (taxiway/taxiway intersection) that is located within 150 feet (45.7 m) of a runway holding position marking, 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 figures C-11 (Note 1) and C-13, where the enhancement is 150 feet (45.7 m) or less and emerges with a straight or curved taxiway centerline, the enhancement terminates at 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. Figures C-10 and C-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 C-13 shows a painted pattern for Runway 16/34 in which an enhancement terminates at 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. Figures C-3 (details A – D) and C-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 C-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 C-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)(6)(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 figures C-9, C-10, C-11, and C-12. Below are the most common geometries and the recommended painting patterns.

(i) Intersecting and Convergent Taxiway Centerlines. As shown in figures C-2 and C-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 C-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 C-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.

a. Purposes. The taxiway edge marking, a dual continuous or dashed marking, is used along a taxi route when it is deemed necessary by the airport operator or the FAA 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. Figures 13, B-3, and B-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. Regardless of the taxi route's site, the location for painting the dashed taxi edge marking must be in accordance with table 4-1 of 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 marking (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. Location. The taxiway edge marking is located such that the outer edge of the continuous line or dashed stripe defines the edge of the usable pavement.

c. 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.

d. Characteristics.

(1) The outermost edge of both marking schemes, as measured from the taxiway centerline, must be painted at a distance equal to one-half the taxiway width per table 4-1 of AC 150/5300-13

(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 B-3 This continuous marking must be used to designate NO-TAXI islands as shown in figure 17. 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(c). 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 ADGs I and II; 15 feet (4.5 m) for ADG III, 20 feet (6.0 m) for ADG IV; and 25 feet (7 6 m) for ADGs V and VI. Width and separation between striated yellow stripes follow paragraph 1.3(c) 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 stripes that are at least 6 inches (15 cm) in width and spaced 6 inches (15 cm) apart (edge to edge) as shown in figures B-4 or B-5. The dashed stripes are 15 feet (4.5 m) in length with 25-foot (7 5-m) gaps as shown in figure 13. This marking is never used to designate NO-TAXI islands

Runway Incursion Mitigation Requirement (Safety)
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 dash 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 dash 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 figures C-5 (non-centered), C-6 (centered) and C-15 (stacked) The surface painted holding position sign is used only on those taxiways (not runways) with a Pattern A or B 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 15, 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 15 shows the POFZ critical area overlapping the holding bay at the entrance to the runway.

14 Code of Federal Regulation (CFR) Part 139 Certificated Airports Runway Incursion Mitigation (Safety)
The surface painted holding position sign (SPHPS), as illustrated in figures C-5 or C-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 ADGs III–VI and centered over the taxiway centerline for ADGs I and II even if a vertical runway holding position sign exists For ADGs III–VI, 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). The surface painted holding position sign is part of the standard signage requirements under 14 CFR Section 139 311(b)(1)(ii) with compliance dates as follows. For 14 CFR Part 139 certificated airports with two or more runways, December 31, 2010 (unchanged per Change 1 of AC 150/5340-1J, dated March 31, 2008). For 14 CFR Part 139 certificated airports with one runway, ***effective 2 years from the issue date of this AC.***

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 airplane design group, i e., all taxiway entrances have the same standard width, some existing runways have varied taxiway widths serving more than one airplane design group. In such cases, the taxiway's airplane design group for that taxiway entrance will determine the location (and number) of the surface painted marking. For example, a runway with an airport reference code of C-IV has one taxiway entrance built to the smaller airplane design group (ADG) I. For this entrance a single, centered surface painted marking as shown in figure C-6 is painted while the other larger ADG IV 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 figures C-5, C-6, and C-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) (ADGs III – VI), 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 C-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 figures C-9 through C-12 and C-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 C-5. If the taxiway centerline is not perpendicular, then placement is in accordance with figure C-7.

(ii) For taxiways widths of 35 feet (10.5 m) or less (ADGs I and II), 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 C-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 C-7. **NOTE**: This new criterion becomes effective 2 years from the issue date of this advisory circular. That is, airport operators with required off-centered SPHPS have up to 2 years to center the taxiway SPHPS.

(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. Figures C-3, C-12, and C-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 figures C-9 and C-12 for ADGs III–VI standard taxiway widths. In the case of ADGs I–II 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) with compliance dates as follows. For 14 CFR Part 139 certificated airports with two or more runways, December 31, 2010 (unchanged per Change 1 of AC 150/5340-1J, dated March 31 2008). For 14 CFR Part 139 certificated airports with one runway, ***effective 2 years from the issue date of this AC.***

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 ADGs I and II 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.

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 ADGs I and II)

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 17 at each midpoint between parallel taxiway centerlines See paragraph 4.4(d) 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 term Airplane Design Group Category is defined in AC 150/5300-13.
Note 2: Each entry equals the taxiway centerline to parallel taxiway centerline value listed in table 2-3 of 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 C-5) or directly centered over the taxiway centerline (figure C-6) For taxiways with dual surface markings, such as shown in figure C-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 – 3.1 m) to the listed value in table 4-1. This numeric range is the dimension letter B used in figure C-5.
Note 4: Each entry is half of the taxiway centerline to parallel taxiway centerline value listed in table 2-3 of AC 150/5300-13.

Condition 2.

Any ADG III–VI airport 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 figures C-5, C-12 curve #3, and C-14, the design airplane for that runway is unable to line up its entire 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 figures C-7 and C-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 C-9, that only curve into the runway holding position marking, (2) holding position markings, such as shown in figure C-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.

Figures C-9 through C-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) with compliance dates as follows. For 14 CFR Part 139 certificated airports with two or more runways, December 31, 2010 (unchanged per Change 1, dated March 31 2008). For 14 CFR Part 139 certificated airports with one runway, ***effective 2 years from the issue date of this AC.***

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) (ADGs III – VI), the inscription is 12 feet (3.7 m), but may be reduced in accordance with the criteria in figure C-5.

(ii) For taxiways widths of 35 feet (10.5 m) or less (ADGs I and II), the inscription is in accordance with the criteria in figure C-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 ADGs III–VI standard taxiway widths is 6 feet (1.8 m) and for ADGs I–II 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 C-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). See figure C-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 A.

(3) The background is rectangular and extends horizontally and vertically beyond the extremities of the inscription for a minimum of 7 5 inches (19 cm) for ADGs I–II standard taxiway widths and 15 inches (38 cm) for ADGs III–VI 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.

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 when it is not possible to provide a taxiway direction sign in accordance with AC 150/5340-18. An exception is 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.

b. 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 17. 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 as specified in AC 150/5300-13, table 2-3, fixed/movable object criterion.

(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 specified in AC 150/5300-13, table 2-3, fixed/movable object criterion, 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

c. 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.

d. 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 A.

(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(d)(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. When deemed necessary by the FAA this marking is used to supplement other signs located along the taxiway system where operational experience has indicated that its presence can assist flight crews in better ground navigation. For signage provisions, see AC 150/5340-18.

b. 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 17. 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

c. 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

d. 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 A

(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, when necessary, to assist pilots in locating their assigned terminal gate. The marking is especially useful for low-visibility operations

b. 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 figures 18 and 19. 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.

c. 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.

d. Characteristics.

(1) For surface painted gate destination signs containing only a single row of several gate designations as shown in figure 18, 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 19, 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 A.

(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, when necessary, 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. 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 20. 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

c. 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

d. 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 20, 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 A

4.10. TAXIWAY SHOULDER MARKINGS.

a. Purpose. Aprons, holding bays, and taxiways are sometimes provided with paved shoulders or stabilization per paragraph 803 of 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 21 illustrates this surface marking

b. 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 21 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 21

(2) Referring to figure 21 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. 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 21, 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 9, 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.

c. Color. The taxiway shoulder marking is yellow. For NO-TAXI islands with a stabilized interior, it is acceptable to paint the stabilized 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.

d. 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 22, 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. 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 22. 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."

c. Color. The geographic position marking, as shown in figure 22, 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.

d. 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 A

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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 paragraph 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. For roadway signage provisions for either case, see AC 150/5340-18.

b. 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.

c. Color. Vehicle roadway markings are white.

d. 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 13 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 23 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 in table 2-3 of 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. 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.

c. Color. The VOR receiver checkpoint marking is a painted circle of the size and colors shown in figure 24.

d. 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 24.

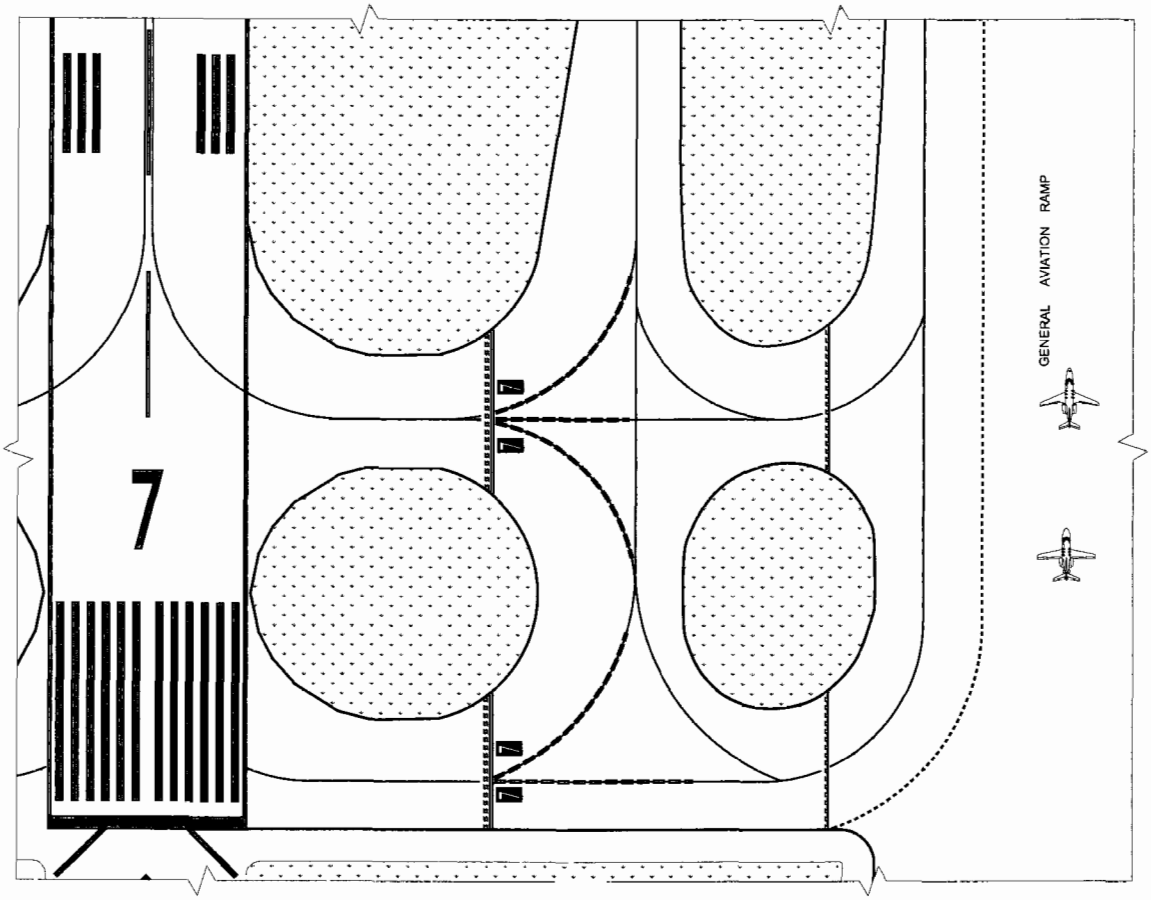
(4) When installed on concrete or other light-colored pavements, the interior of the circle is painted black.

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. This marking should be used only when there is a need for such delineation. 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. 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 Thus, airports without an airport traffic control tower may use the surface marking to help delineate aircraft traffic routes, aircraft parking limits, etc.

b. Location. A non-movement area boundary marking is located on the boundary between the movement and non-movement area as shown in figure 13 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 taxilane centerline to fixed/movable object criteria of table 2-3 of AC 150/5300-13. However, the airport operators 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 is given 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.



NOTE DO NOT SCALE DRAWING THE RUNWAY IDENTIFICATION MARKINGS HAVE BEEN ENLARGED FOR CLARITY

Figure 5-1 Precautionary Placement of the Non-movement Boundary Marking

c. Color. The non-movement area boundary marking is yellow and will be outlined in black on light-colored pavements.

d. Characteristics.

(1) The non-movement area boundary marking consists of two yellow lines, one solid and one dashed as shown in figure 13. 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.

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 25 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 25, 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. 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 25 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. Since the "X" will usually be placed over white runway markings, their visibility can be enhanced by a 6-inch (15-cm) black border.

(2) Option 2. The airport operator uses a raised-lighted "X" on each runway end in lieu of the Option 1 markings to indicate the runway is temporarily closed. The preferred location of the raised-lighted "X" is within 250 feet (76 m) of the runway end. However, it may be located in the safety area on the extended runway centerline.

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 5.14 applies

(2) Option 2. As an alternative, the airport operator may install the same yellow "X" shown in figure 25 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 can not 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 14. 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 150/5345-56, Specification for L-890 Airport Lighting Control and Monitoring System (ALCMS), for information about taxiway edge lights; Specification for L-853 Runway and Taxiway Retroreflective Markers in AC 150/5345-53, Airport Lighting Equipment Certification Program, for retroreflectors; 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 150/5345-30.

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. VERTIPORT MARKINGS. Information on markings for vertiports is in AC 150/5390-3, Vertiport Design.

5.13. MARKING FOR ARRESTING GEAR. Information on marking for arresting gear is in AC 150/5220-9, Aircraft Arresting Systems on Civil Airports.

5.14. 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.

5.15 AIRCRAFT DEICING FACILITY MARKINGS. Information on markings for aircraft deicing facilities is in AC 150/5300-14, Design of Aircraft Deicing Facilities.

5.16. 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 Figures 5-2 and 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.

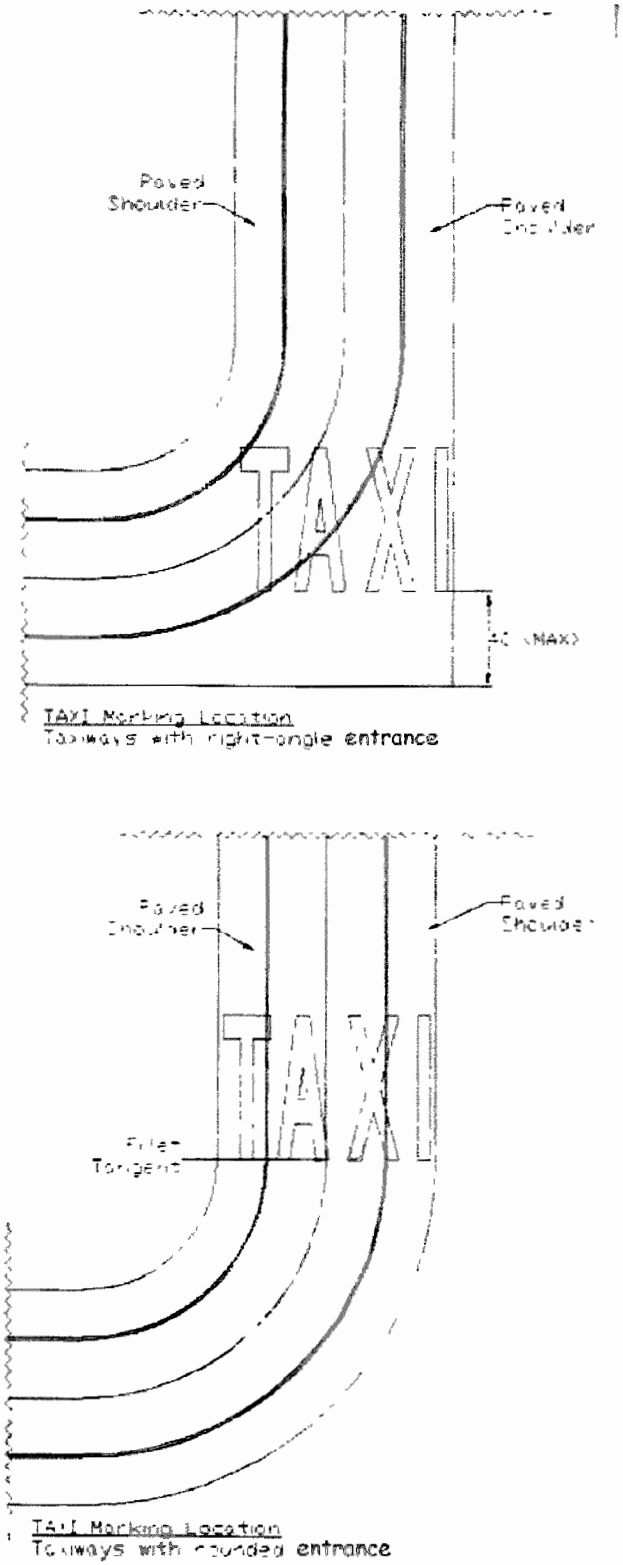
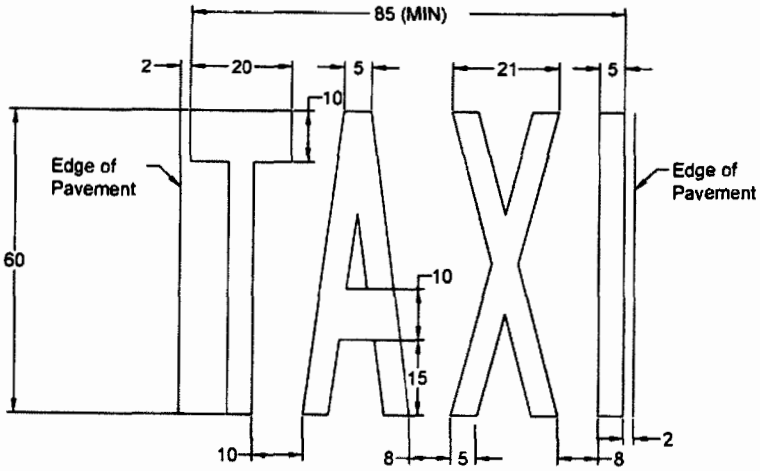


Figure 5-2. TAXI Marking Location Facing Runway Approach End



Note: These are minimum dimensions (in feet). If the existing taxiway plus paved shoulder is not wide enough to accommodate these markings, then provide a paved pad or wider shoulder in the area where the marking is to be installed.

Figure 5-3. TAXI Marking Dimensions

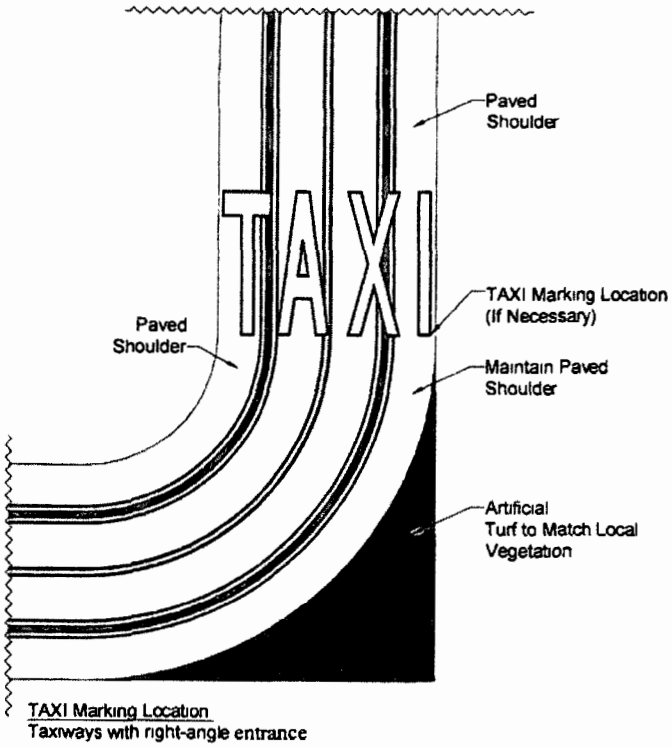
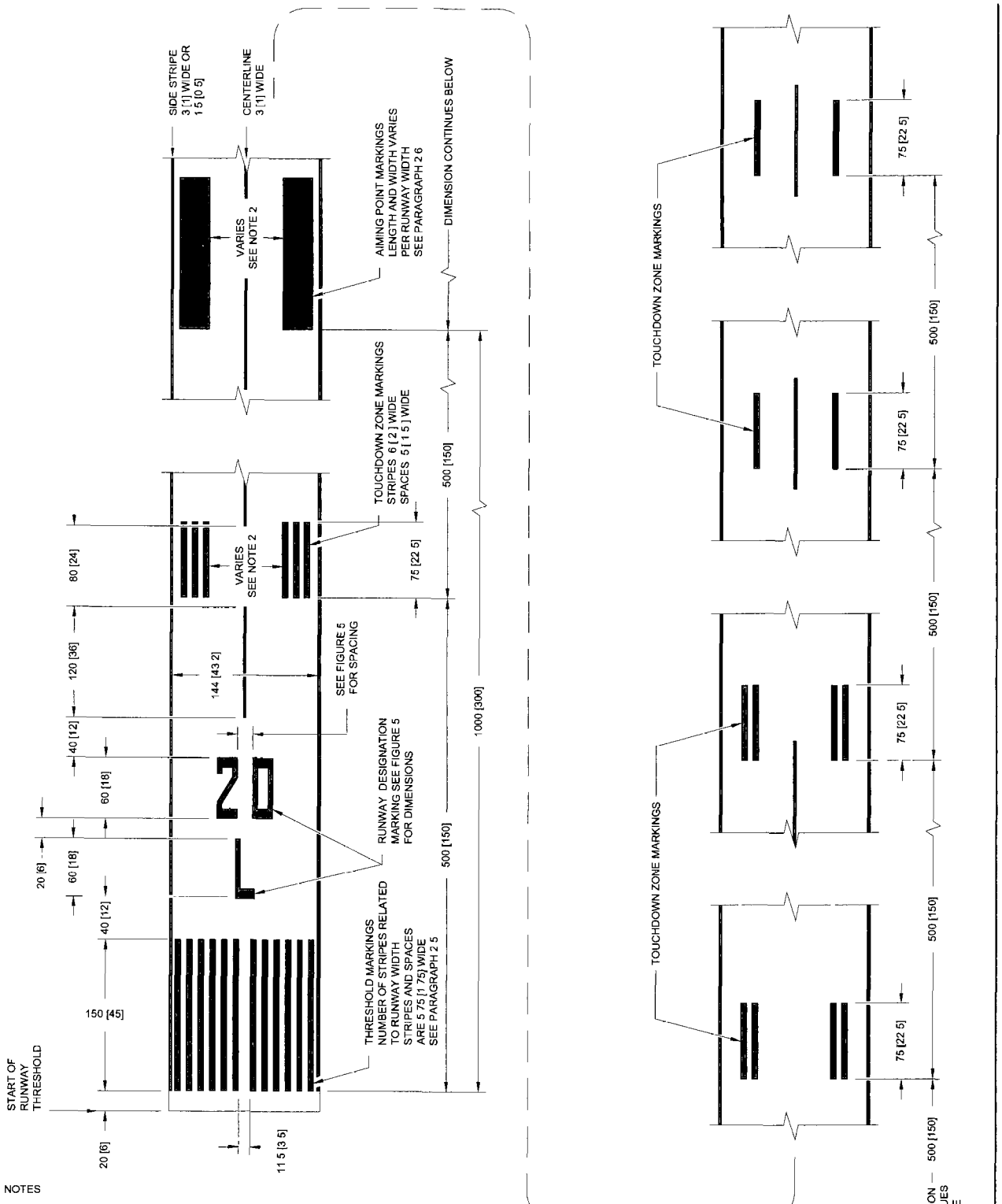


Figure 5-4. Aviation Grade Artificial Turf Installation

All figures except figures 5-2, 5-3, and 5-4 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 provided in MS Word or Adobe Reader. 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



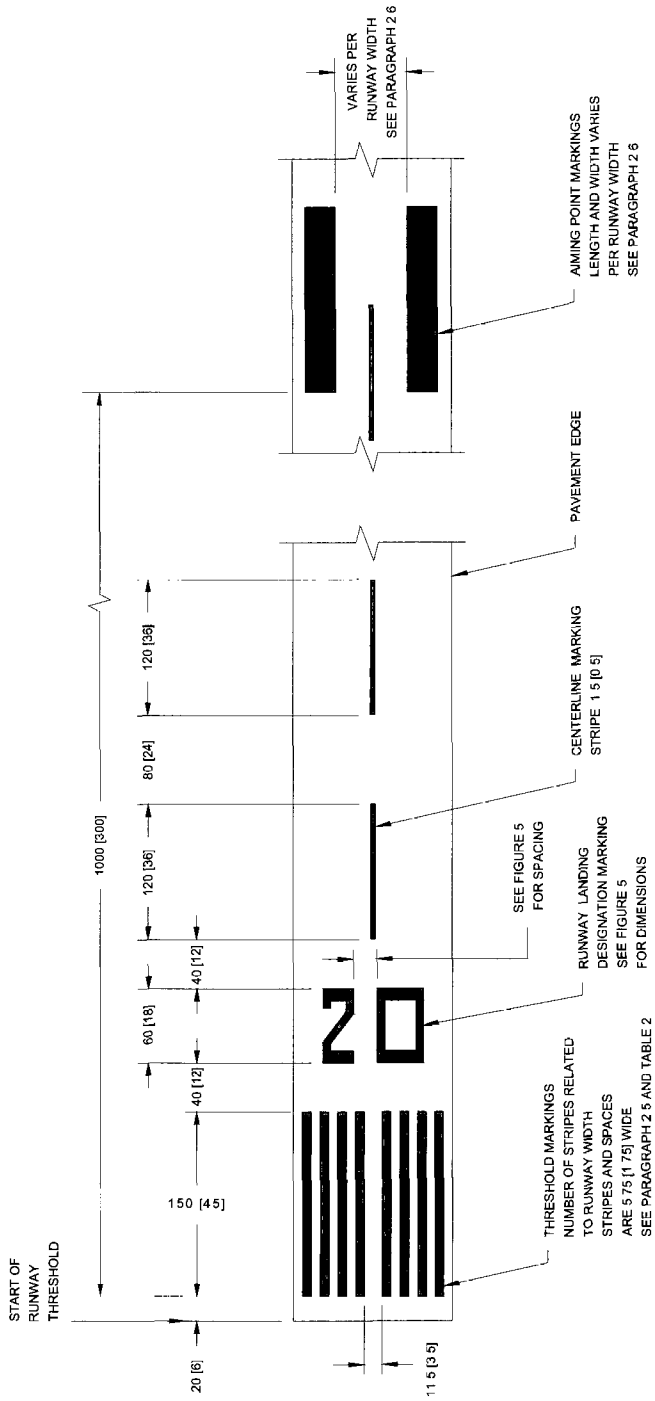
NOTES

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

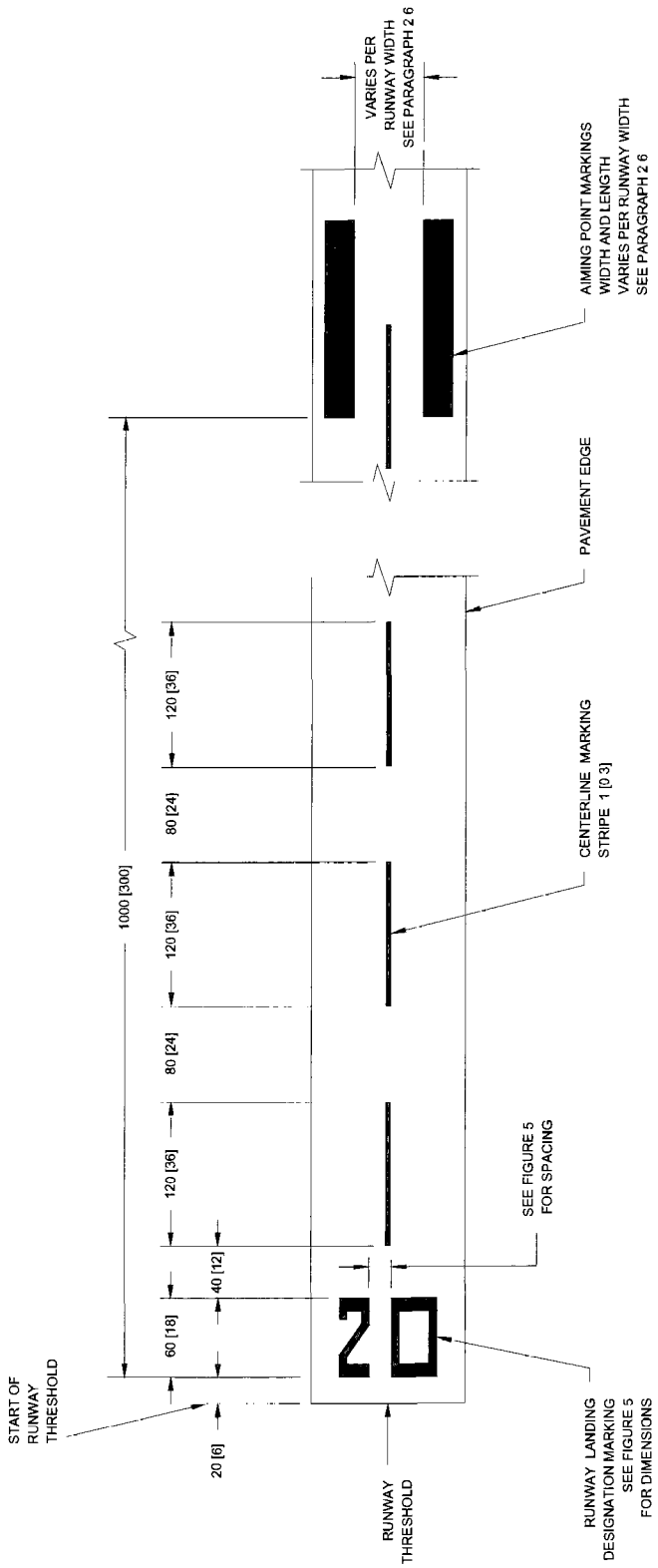
Figure 1. Precision Runway Markings



NOTES

1 DIMENSIONS ARE EXPRESSED IN FEET [METERS]

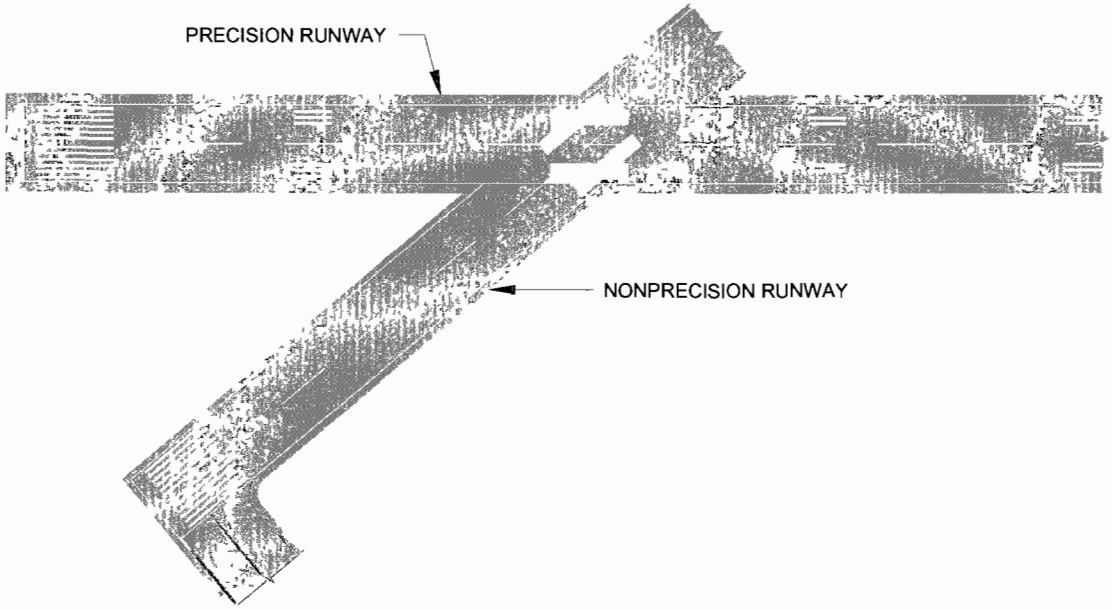
Figure 2. Non-precision Runway



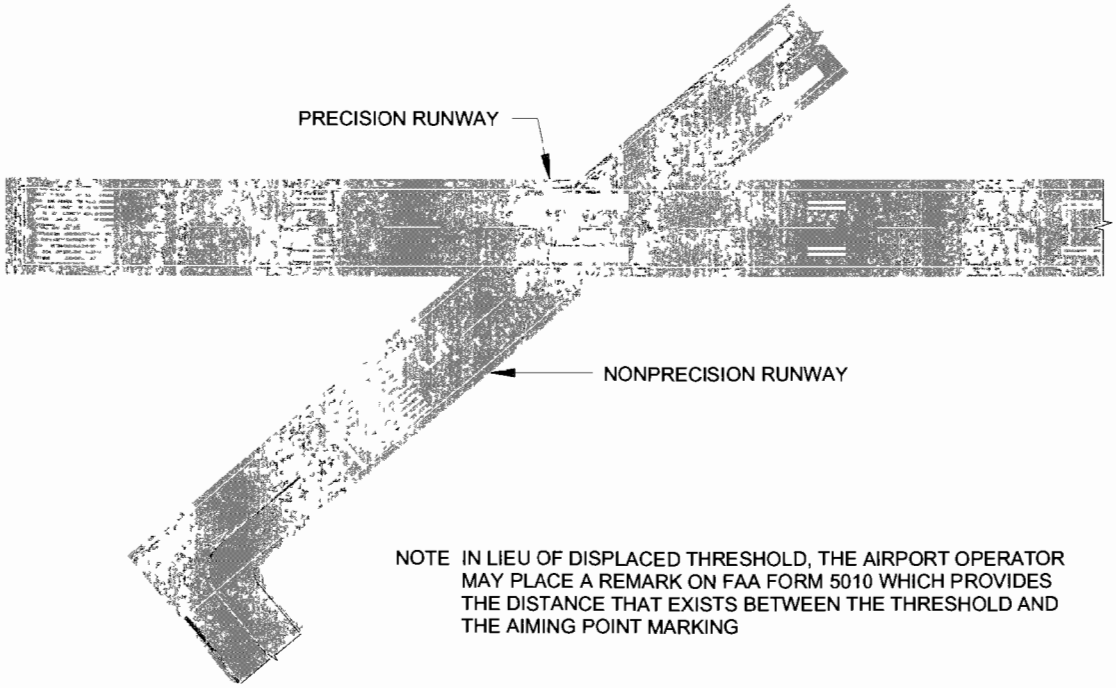
NOTES

1 DIMENSIONS ARE EXPRESSED IN FEET [METERS]

Figure 3. Visual Runway Markings



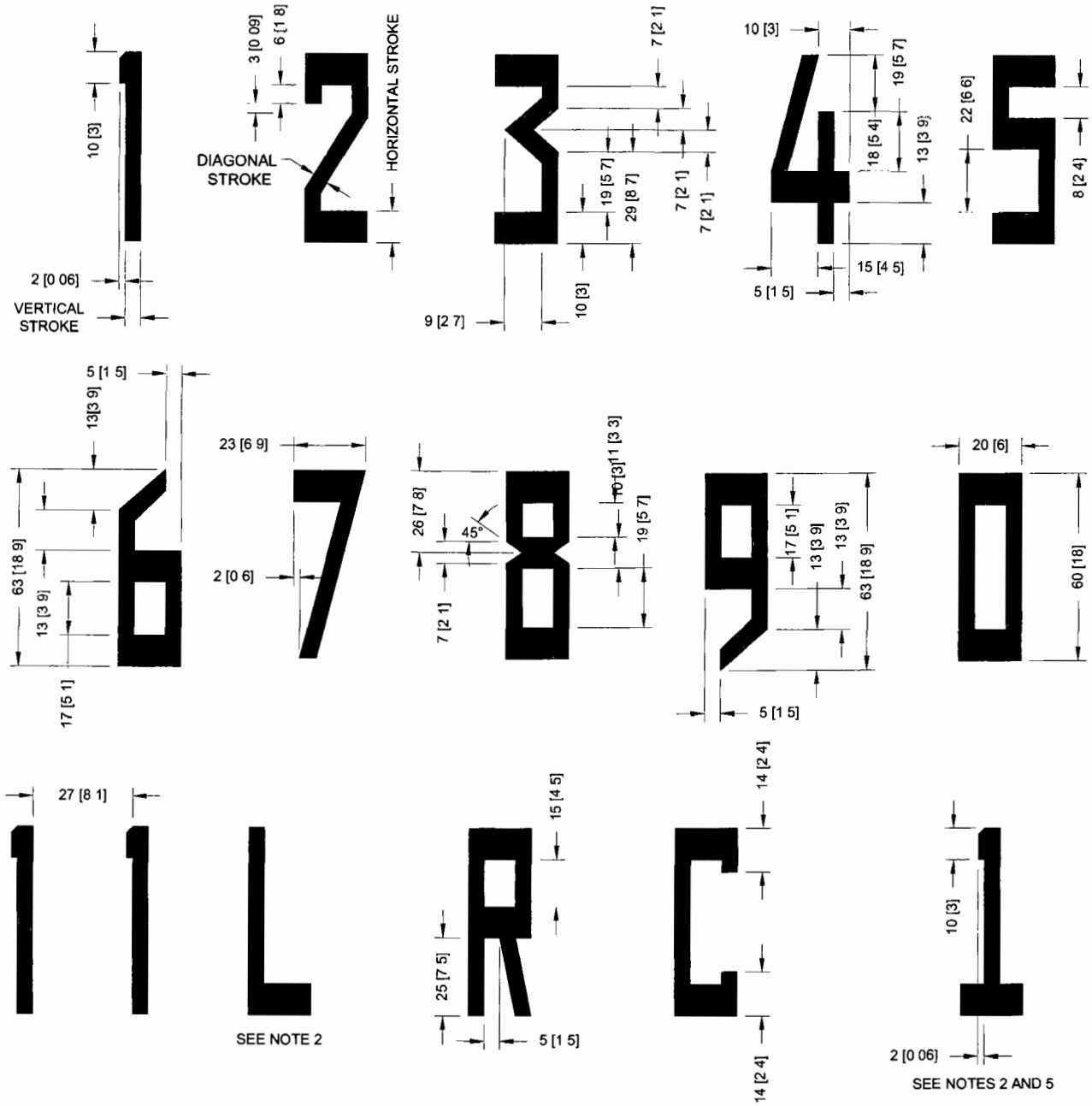
EXAMPLE OF CONFLICTING RUNWAY MARKINGS



ONE SOLUTION
THRESHOLD AND AIMING POINT OF THE LOWER PRECEDENCE RUNWAY DISPLACED TO MAINTAIN THE REQUIRED DISTANCE FROM THE AIMING MARKING TO THE THRESHOLD

Enlarge figure for greater detail.

Figure 4. Example of Conflicting Markings on Crossing Runways



NOTES

1 DIMENSIONS ARE EXPRESSED FEET [METERS]

2 ALL CHARACTERS SHALL 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

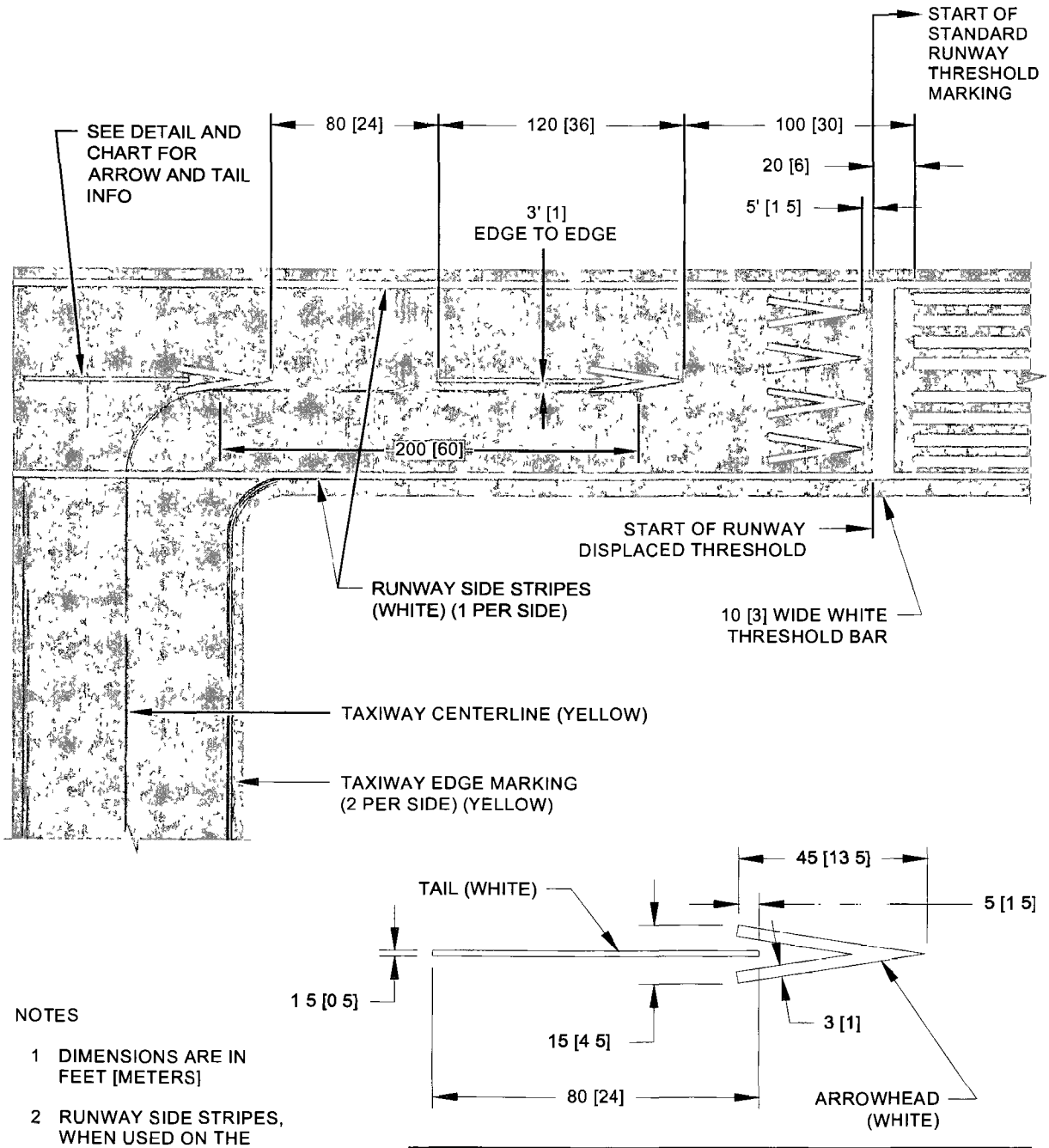
4 SINGLE DIGITS MUST NOT BE PRECEDED BY A ZERO

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 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 1

Figure 5. Runway Designation Numerals and Letters



NOTES

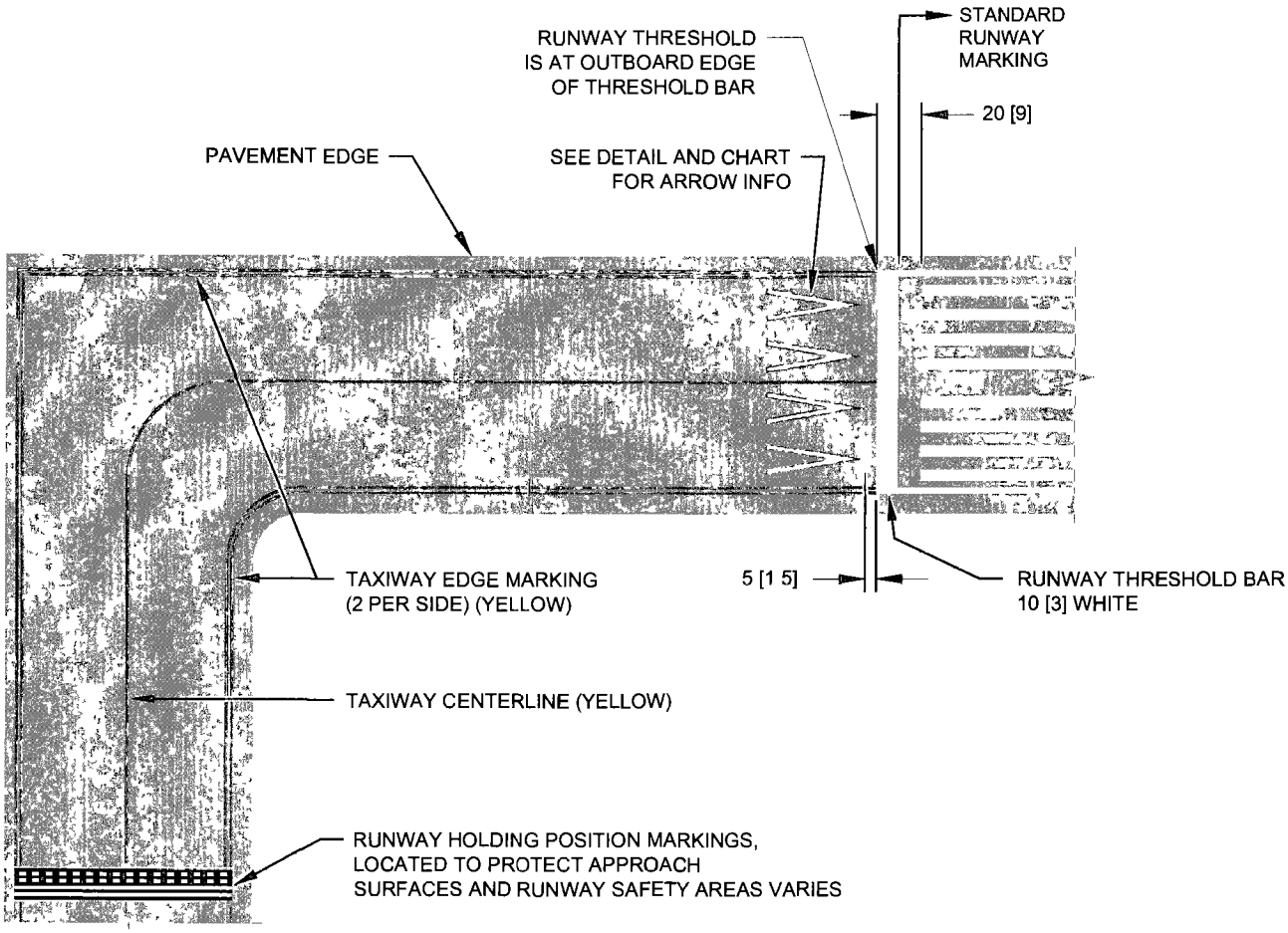
1 DIMENSIONS ARE IN FEET [METERS]

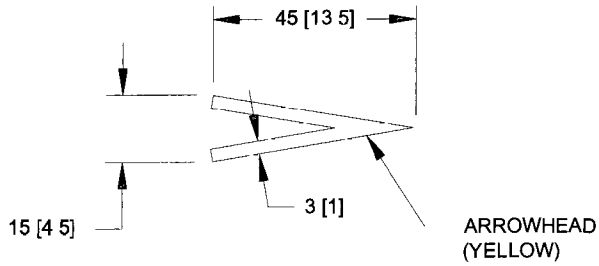
2 RUNWAY SIDE STRIPES, WHEN USED ON THE RUNWAY, EXTEND INTO THE DISPLACED AREA

3 RUNWAY MARKINGS (EXCEPT HOLDING POSITION MARKINGS) INCLUDING THOSE IN THE DISPLACED THRESHOLD ARE WHITE

RUNWAY WIDTH	NUMBER OF ARROWHEADS	SPACING BETWEEN ARROWHEADS (W = RUNWAY WIDTH)	SPACING TO RUNWAY EDGE
≥ 100 [30]	4	W/4	W/8
< 100 [30]	3	W/3	W/6
< 60 [18]	2	W/2	W/4

Figure 6. Displaced Threshold Markings



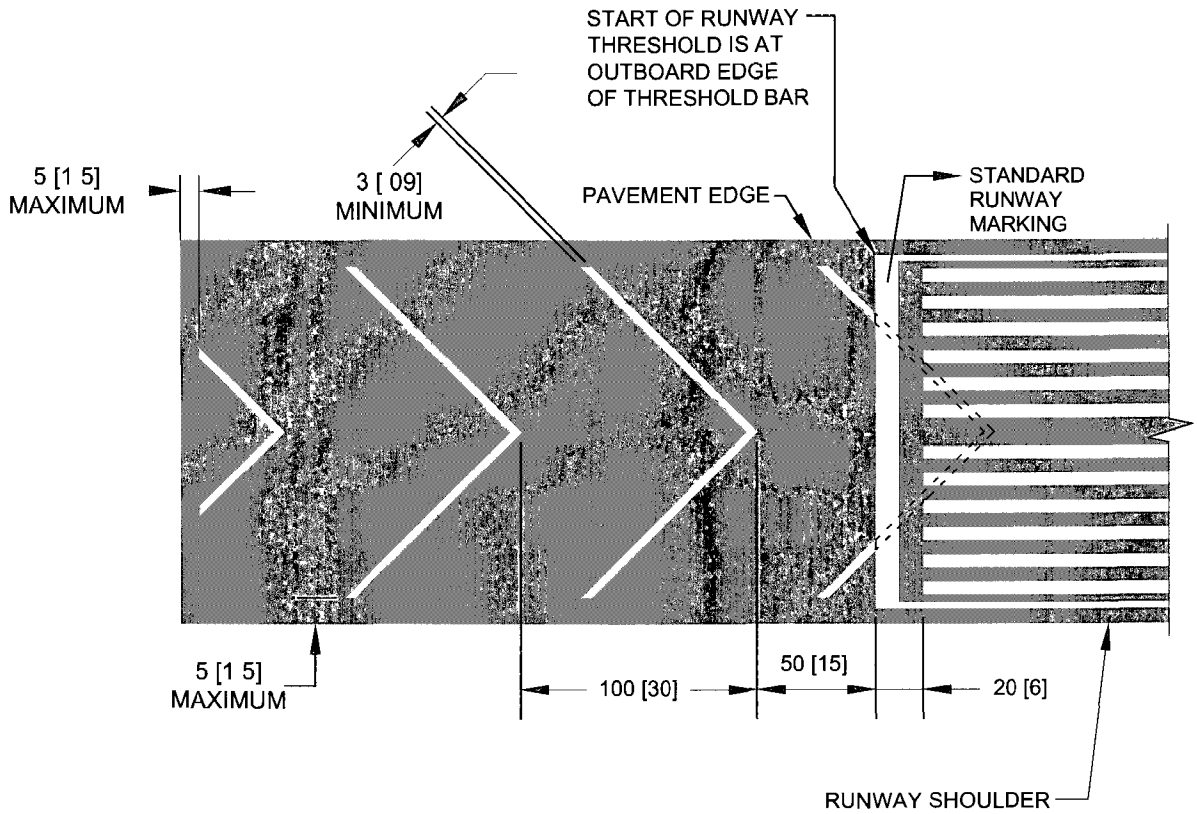


NOTES

1 DIMENSIONS ARE IN FEET [METERS]

RUNWAY WIDTH	NUMBER OF ARROWHEADS	SPACING BETWEEN ARROWHEADS (W = RUWNAY WIDTH)	SPACING TO RUNWAY EDGE
≥ 100 [30]	4	W/4	W/8
< 100 [30]	3	W/3	W/6
< 60 [18]	2	W/2	W/4

Figure 7. Marking for Aligned Taxiway with Runway Without a Displaced Threshold



NOTES

1 DIMENSIONS ARE 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]

Figure 8. Markings for Blast Pads and Stopways

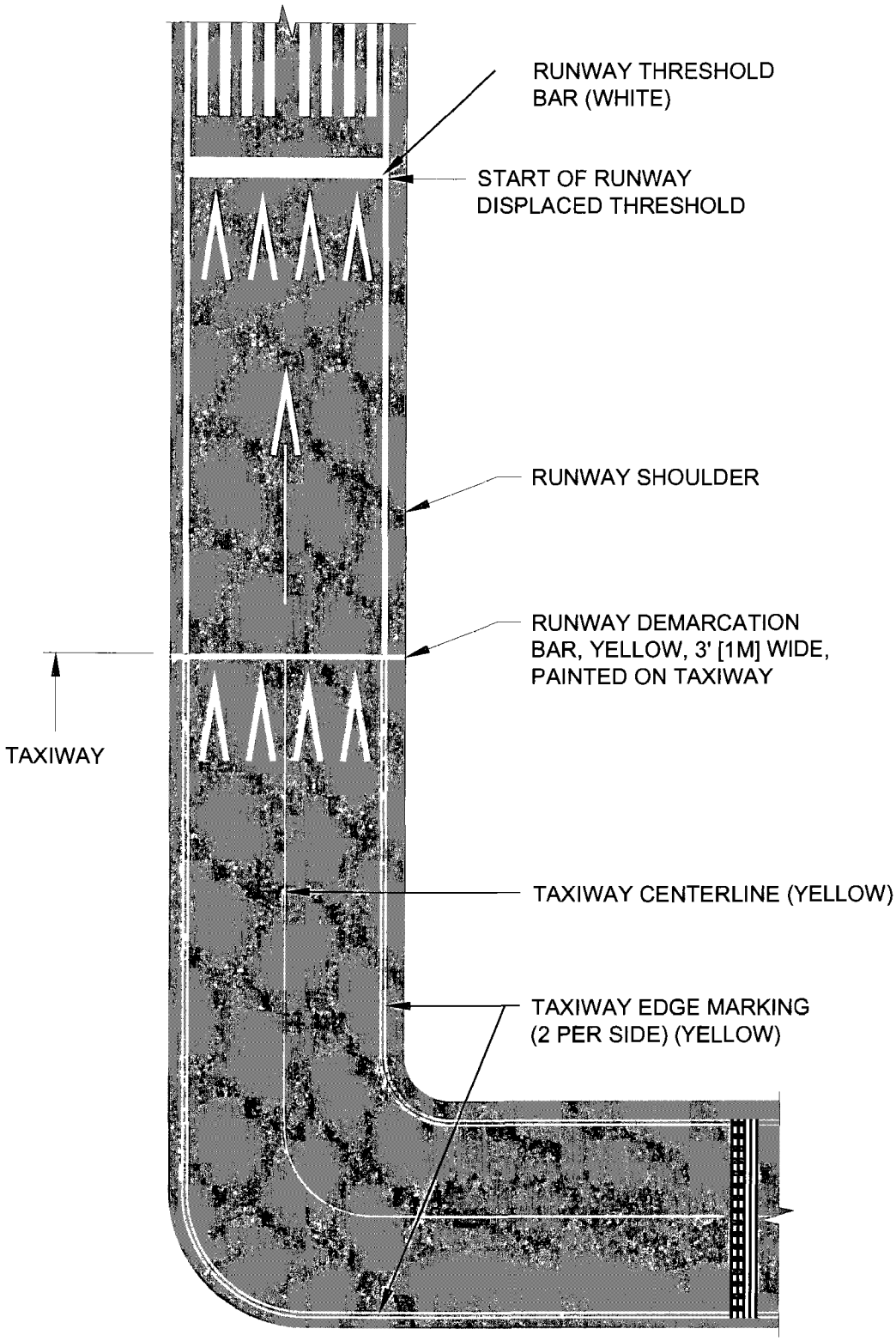
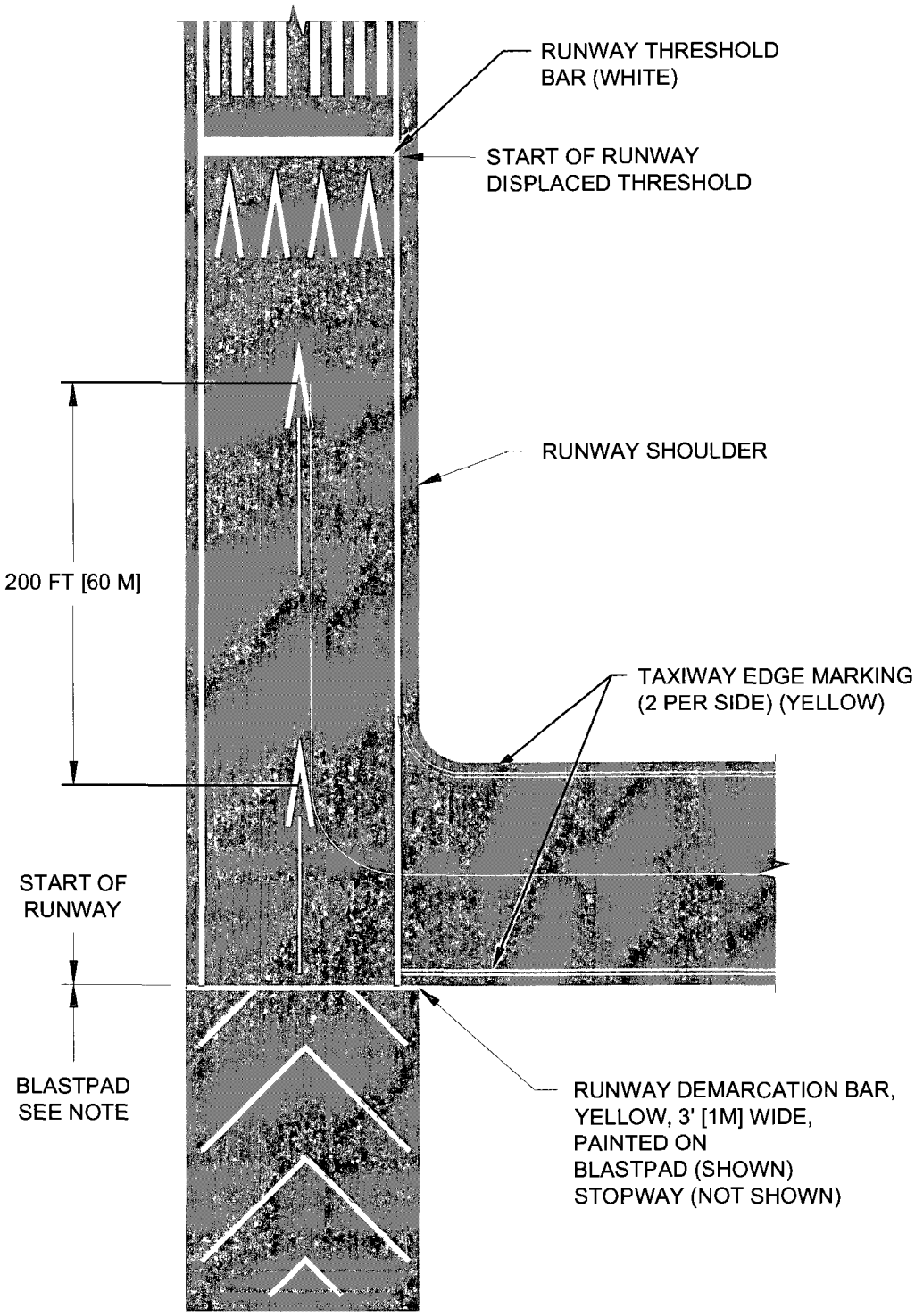


Figure 9. Markings for Aligned Taxiway Preceding a Displaced Threshold



NOTE STOPWAY WIDTH EQUALS RUNWAY WIDTH
BLASTPAD WIDTH EQUALS RUNWAY WIDTH PLUS RUNWAY SHOULDERS

Figure 10. Markings for Blast Pad Preceding a Displaced Threshold

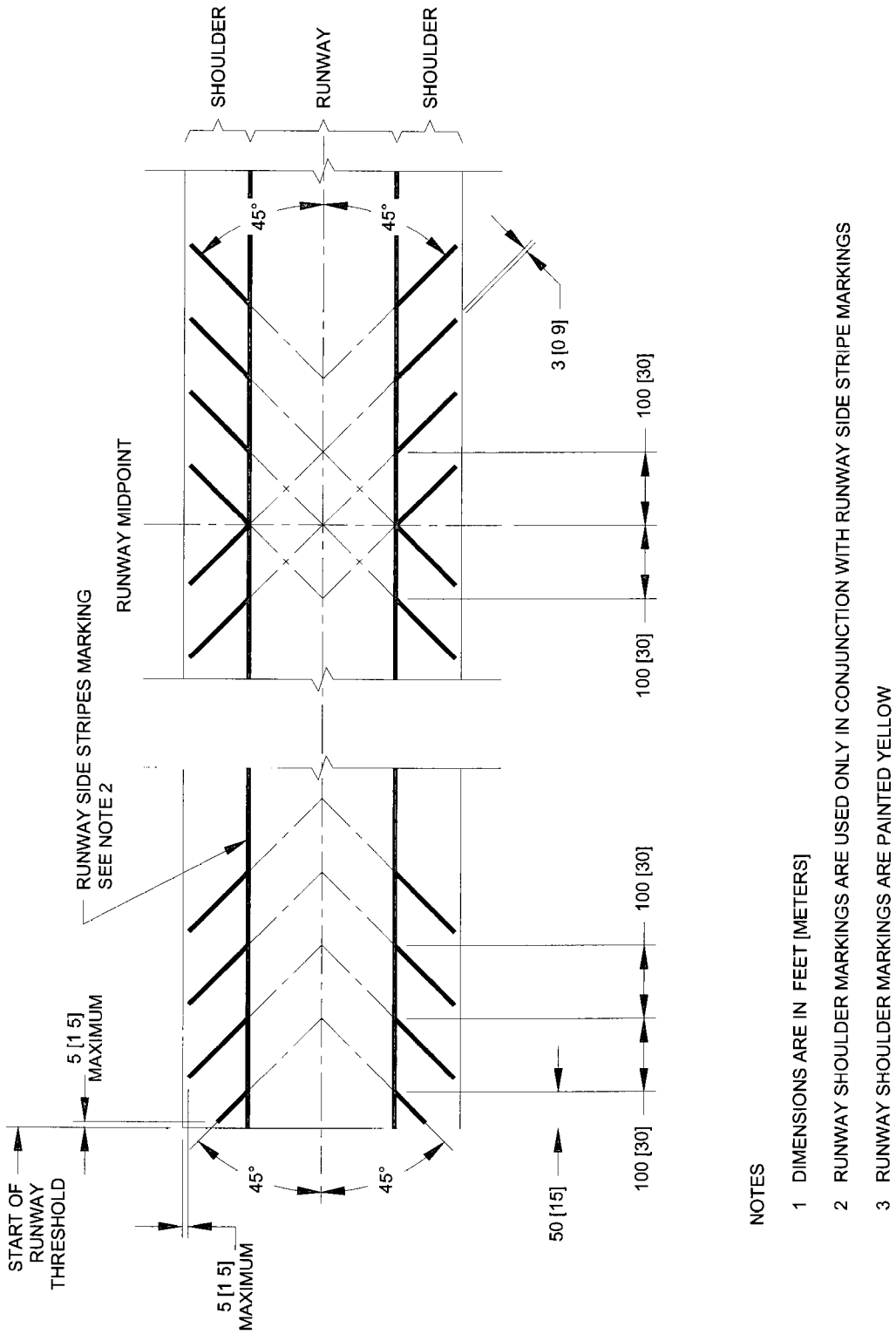
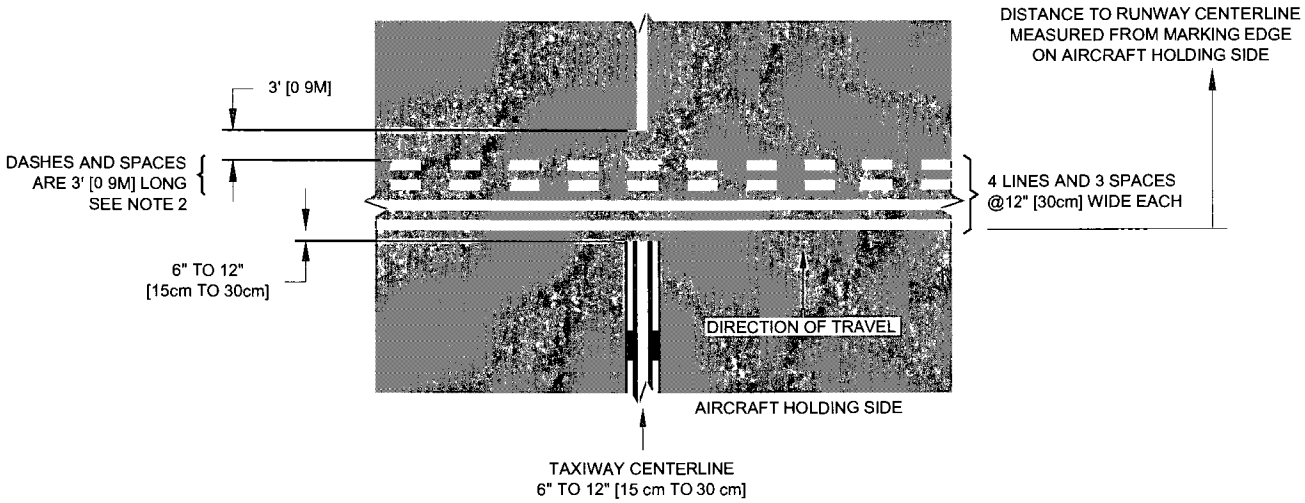
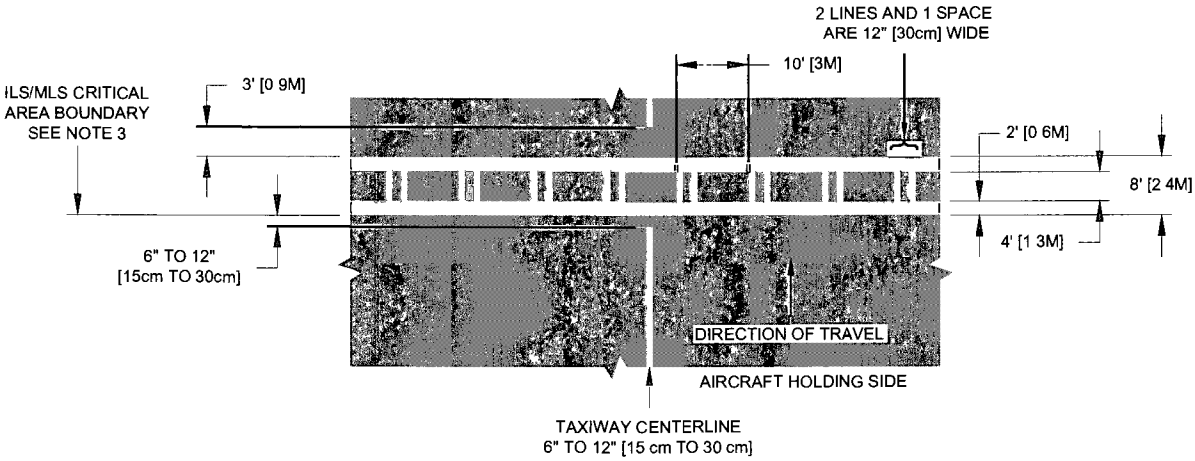


Figure 11. Runway Shoulder Markings



PATTERN A - RUNWAY HOLDING POSITION MARKING



PATTERN B - ILS/MLS HOLDING POSITION MARKING

NOTES

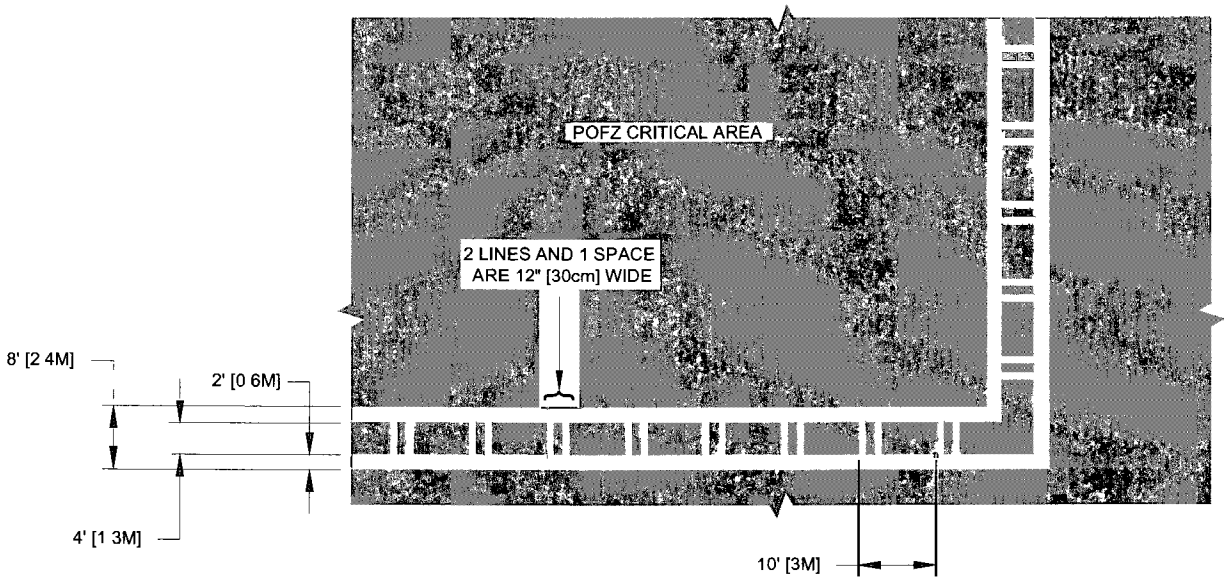
1 UNLESS OTHERWISE NOTED ALL LINES ARE YELLOW

2 SEE PARAGRAPH 3 3 FOR REDUCTIONS

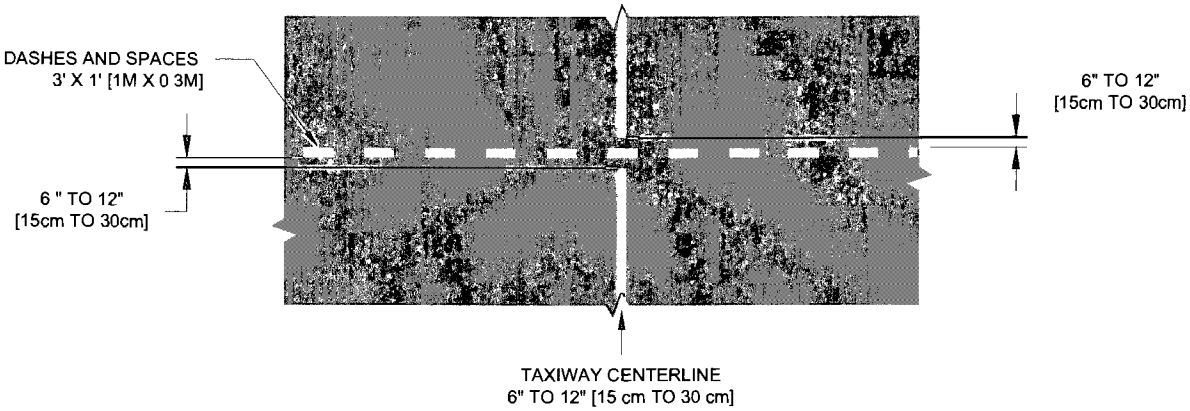
3 SEE PARAGRAPH 3 4 FOR REDUCTIONS

4 DIMENSIONS SHOWN DO NOT ACCOUNT FOR OUTLINE MARKING IN BLACK PAINT WHEN ON LIGHT-COLORED PAVEMENT SEE PARAGRAPH 1 4 AND APPENDIX B

Figure 12. Holding Position Marking Details



PATTERN B - POFZ MARKING



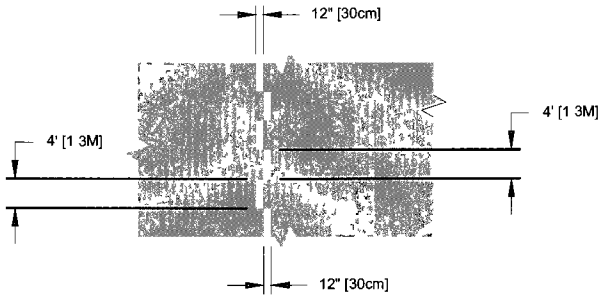
PATTERN C - INTERMEDIATE HOLDING POSITION MARKING FOR TAXIWAY/TAXIWAY INTERSECTIONS

NOTES

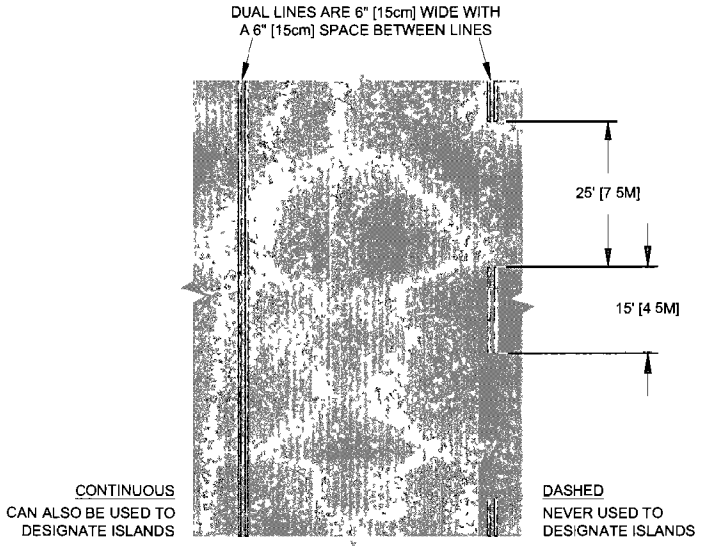
1 UNLESS OTHERWISE NOTED ALL LINES ARE YELLOW

2 DIMENSIONS SHOWN DO NOT ACCOUNT FOR OUTLINE MARKING IN BLACK PAINT WHEN ON LIGHT-COLORED PAVEMENT SEE PARAGRAPH 1 4 AND APPENDIX B

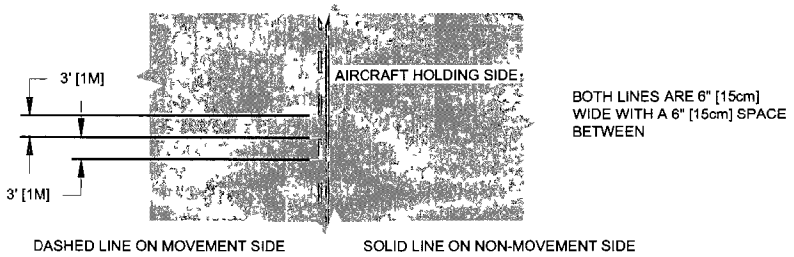
Figure 12a. Holding Position Marking Details



ROADWAY EDGE STRIPES, WHITE, ZIPPER STYLE



TAXIWAY EDGE MARKINGS - 2 CASES



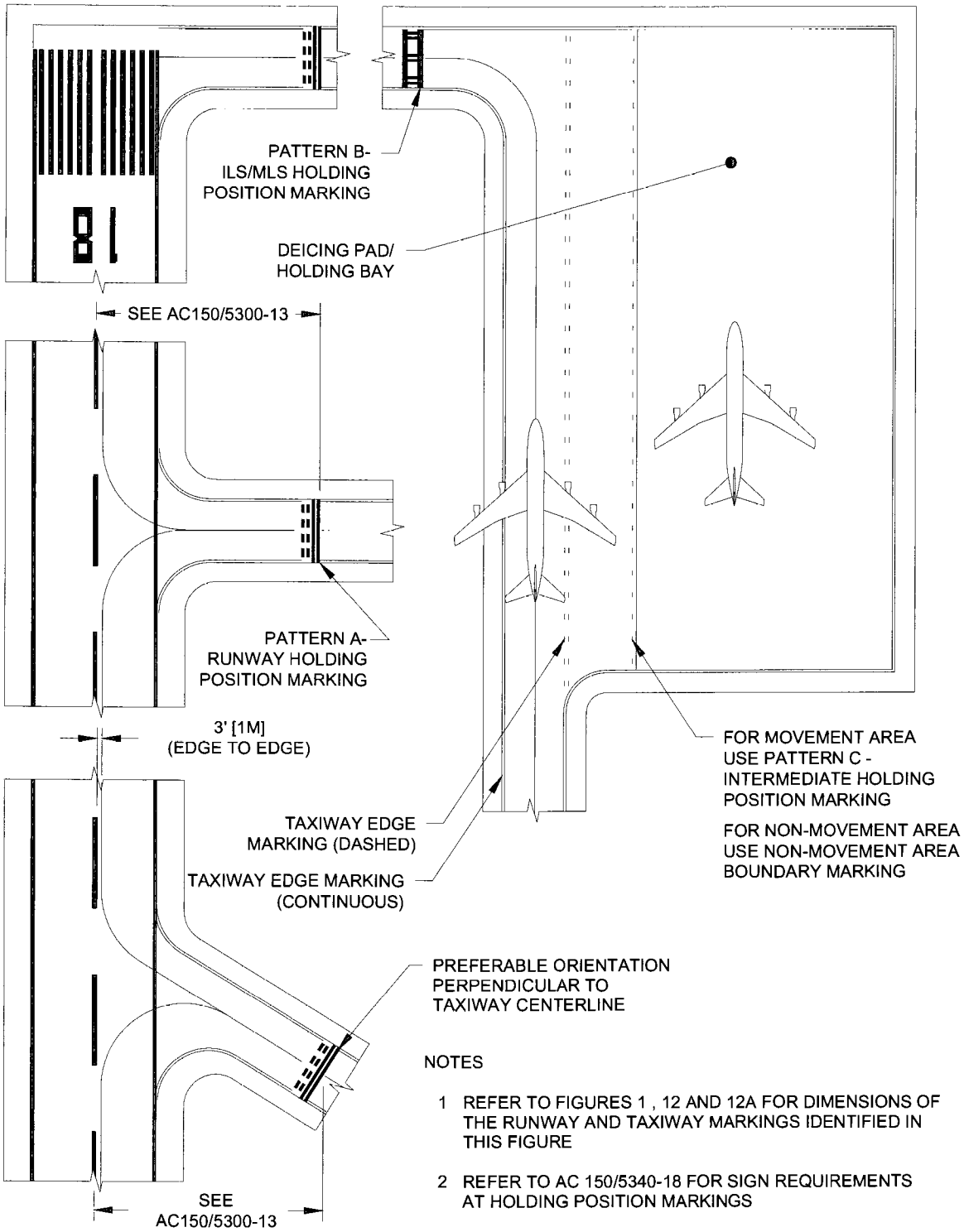
NON-MOVEMENT AREA MARKINGS

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 B

Figure 13. Taxiway Markings

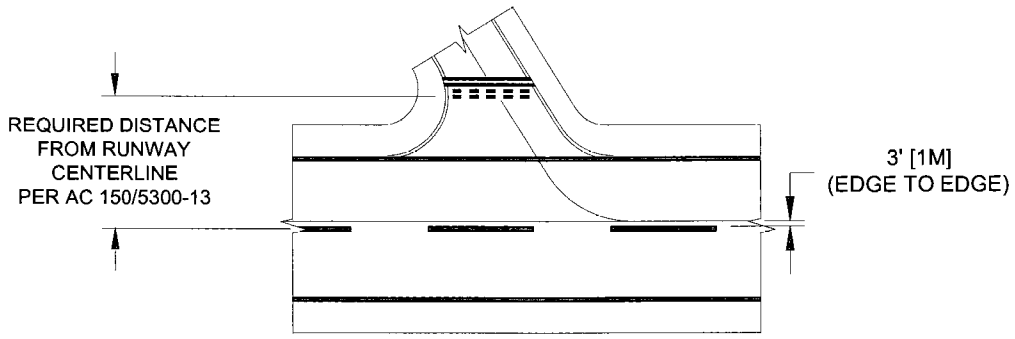


NOTES

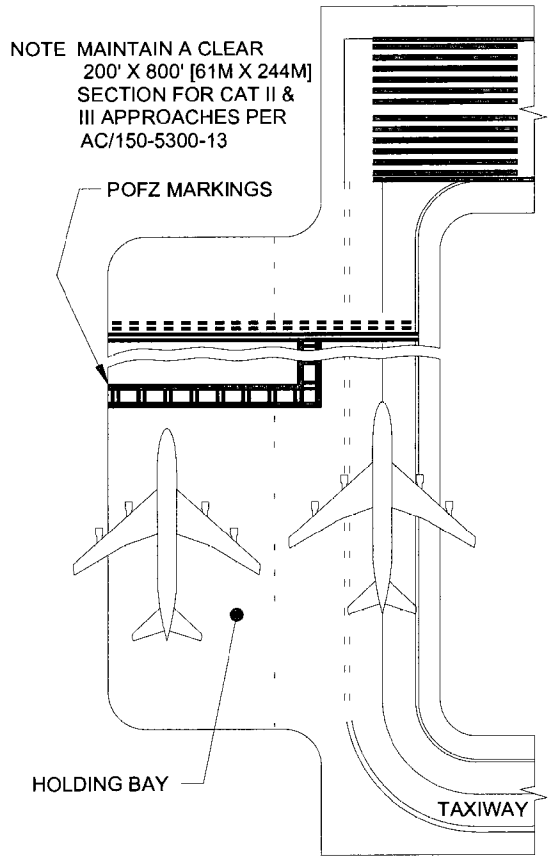
1 REFER TO FIGURES 1 , 12 AND 12A FOR DIMENSIONS OF THE RUNWAY AND TAXIWAY MARKINGS IDENTIFIED IN THIS FIGURE

2 REFER TO AC 150/5340-18 FOR SIGN REQUIREMENTS AT HOLDING POSITION MARKINGS

Figure 14. Taxiway Markings



EXAMPLE OF PATTERN A HOLDING POSITION MARKINGS NOT AT RIGHT ANGLE TO TAXIWAY CENTERLINE THE PREFERABLE ORIENTATION (FIGURE 14) IS TO BE PERPENDICULAR TO THE TAXIWAY CENTERLINE HOWEVER, WHEN THE ANGLE IS VERY ACUTE, AND PART OF THE AIRCRAFT IS IN THE RUNWAY SAFETY AREA, USE THIS METHOD



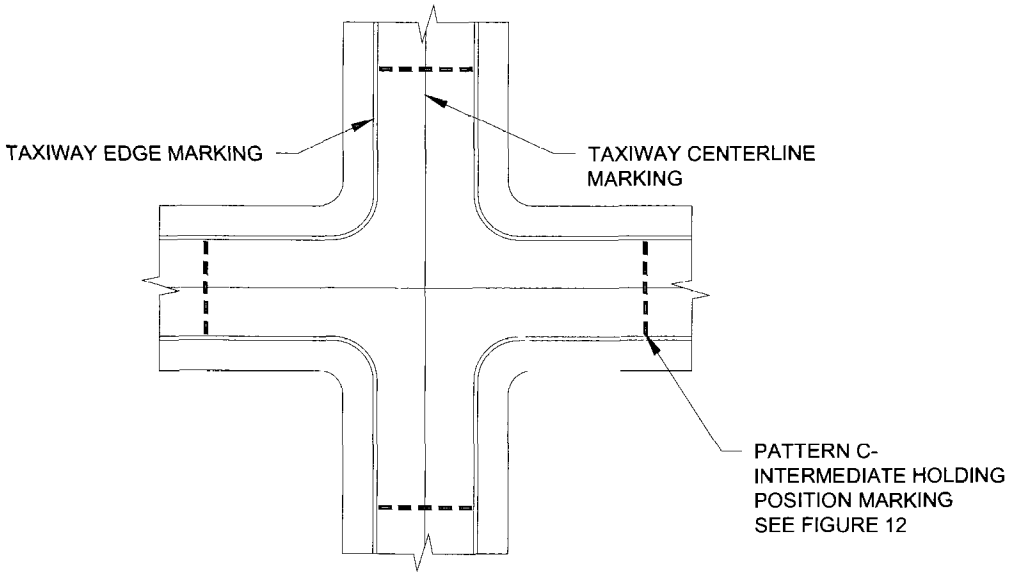
NOTES

1 REFER TO FIGURES 1, 12 AND 12A FOR DIMENSIONS OF THE RUNWAY AND TAXIWAY MARKINGS IDENTIFIED IN THIS FIGURE

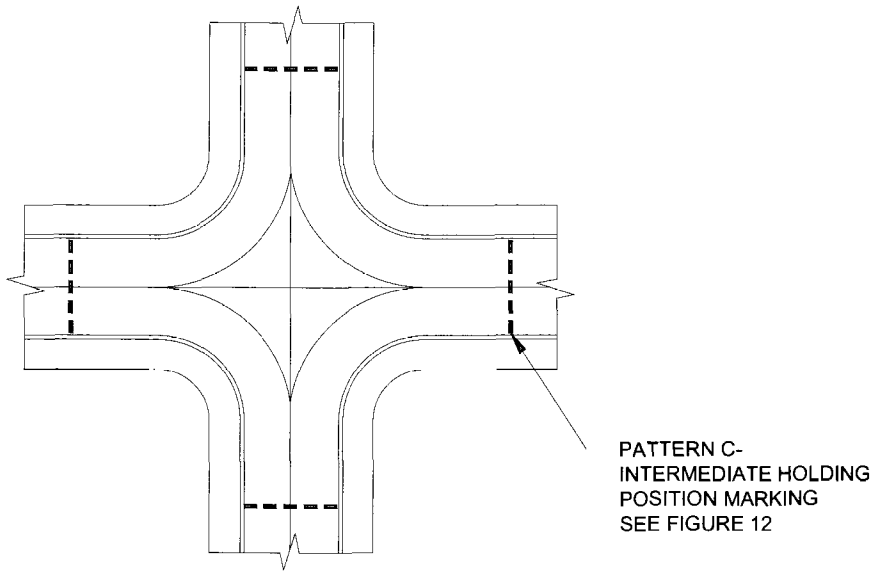
2 REFER TO AC 150/5340-18 FOR SIGN REQUIREMENTS AT HOLDING POSITION MARKINGS

EXAMPLE WHERE PATTERN B POFZ HOLDING POSITION MARKINGS EXTENDING ACROSS HOLDING BAY

Figure 15. Taxiway Markings



TAXIWAY CENTERLINE MARKING AT INTERSECTION HAVING LESS THAN STANDARD FILLETS AND REQUIRING JUDGMENTAL OVERSTEERING



TAXIWAY CENTERLINE MARKING AT INTERSECTION HAVING STANDARD FILLETS PERMITTING COCKPIT-OVER-CENTERLINE STEERING (RECOMMENDED)

NOTE REFER TO FIGURE 11 and 12 FOR DIMENSIONS OF THE TAXIWAY MARKING IDENTIFIED IN THIS FIGURE

Figure 16. Methods for Taxiway Centerline Marking

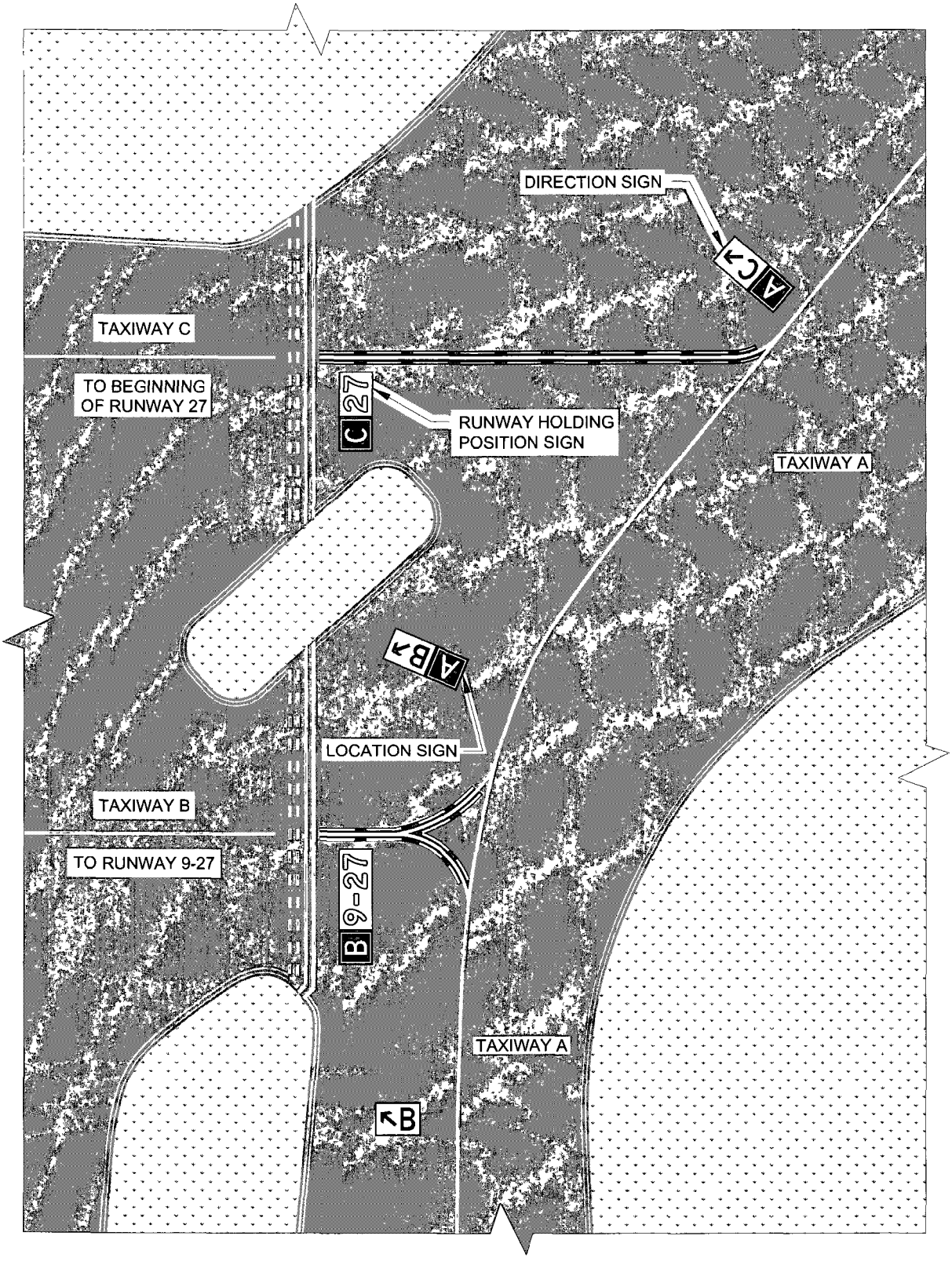


Figure 17. Surface Painted Signs

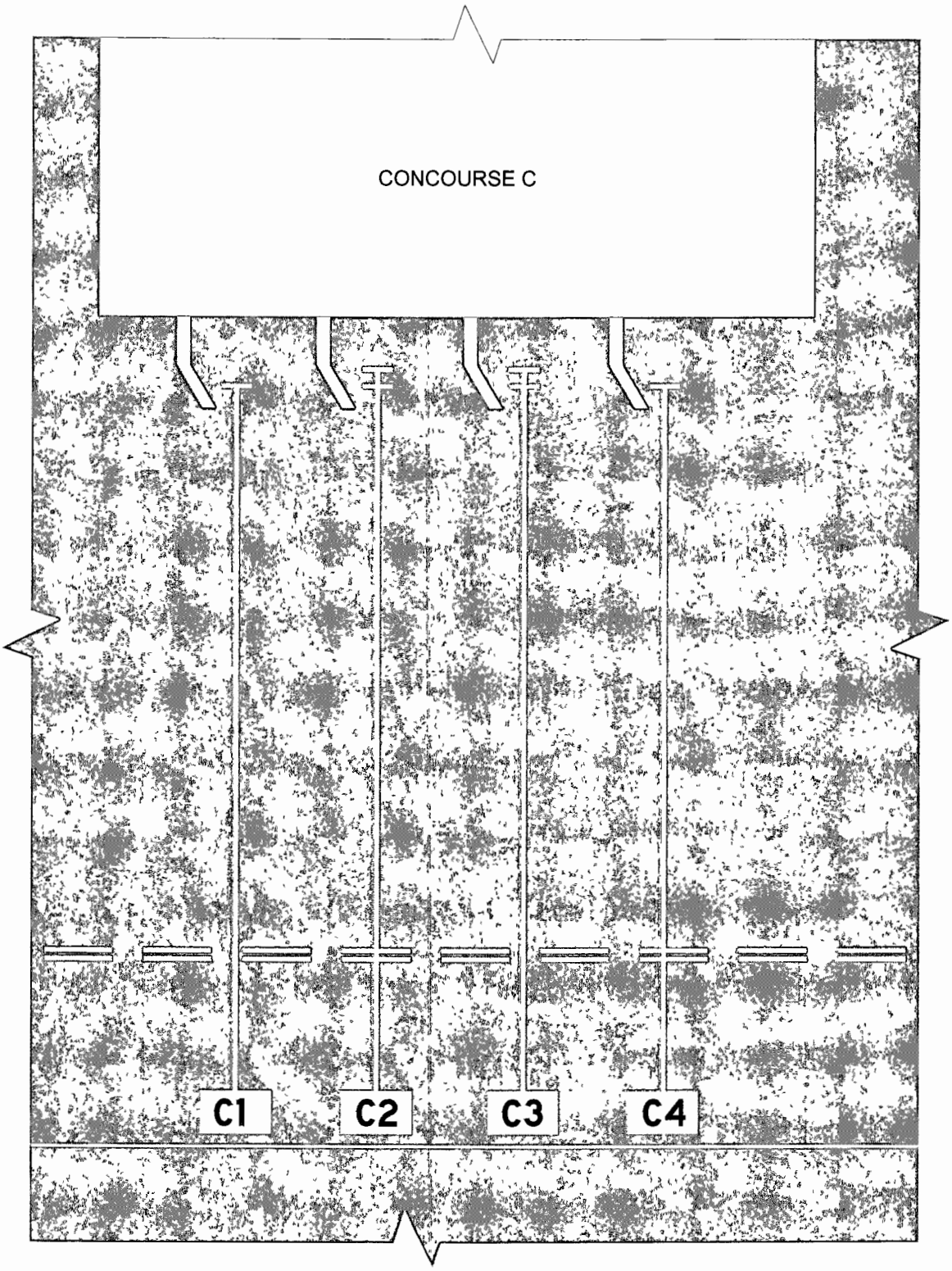


Figure 18. Surface Painted Gate Identification Signs

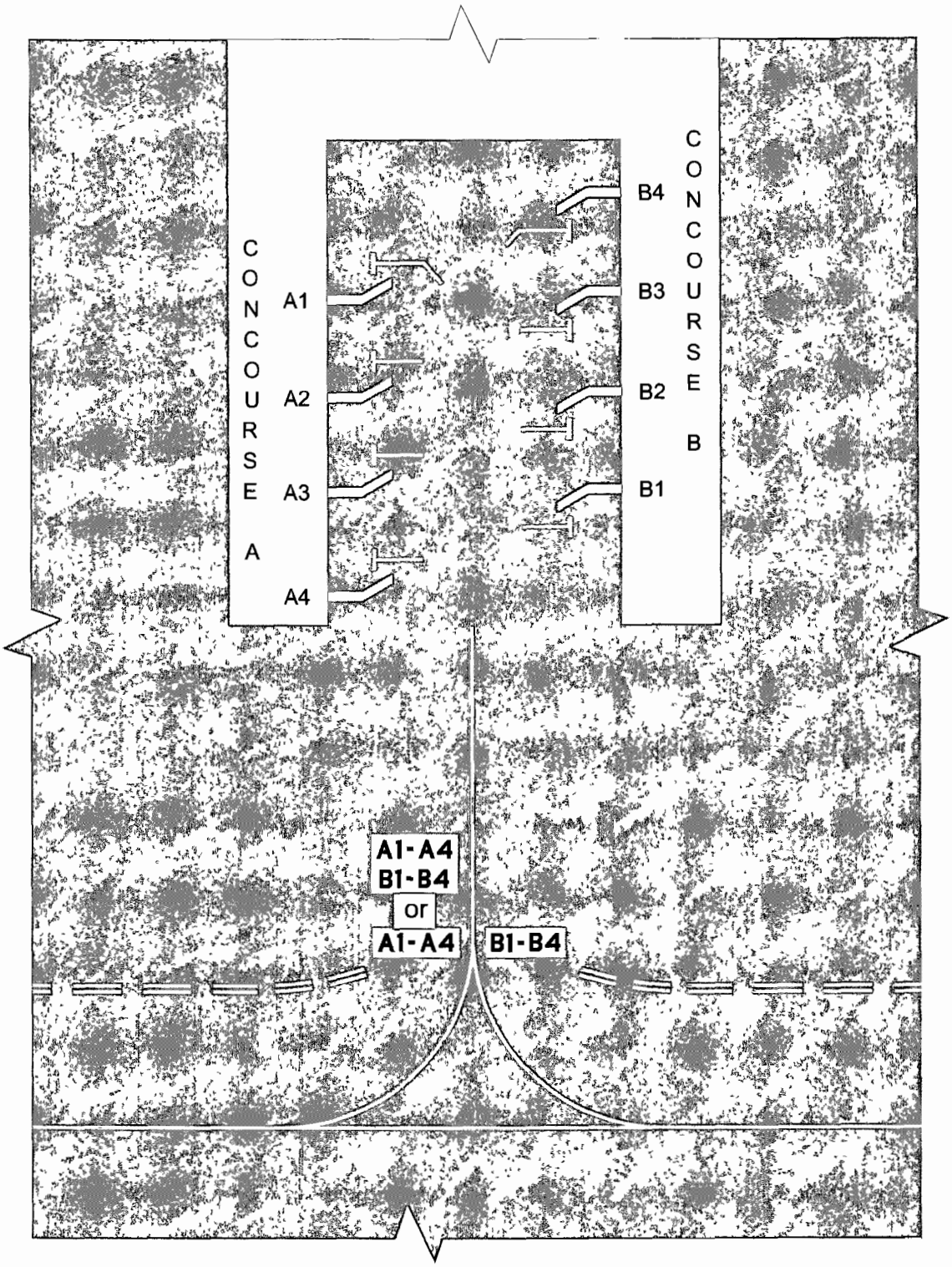
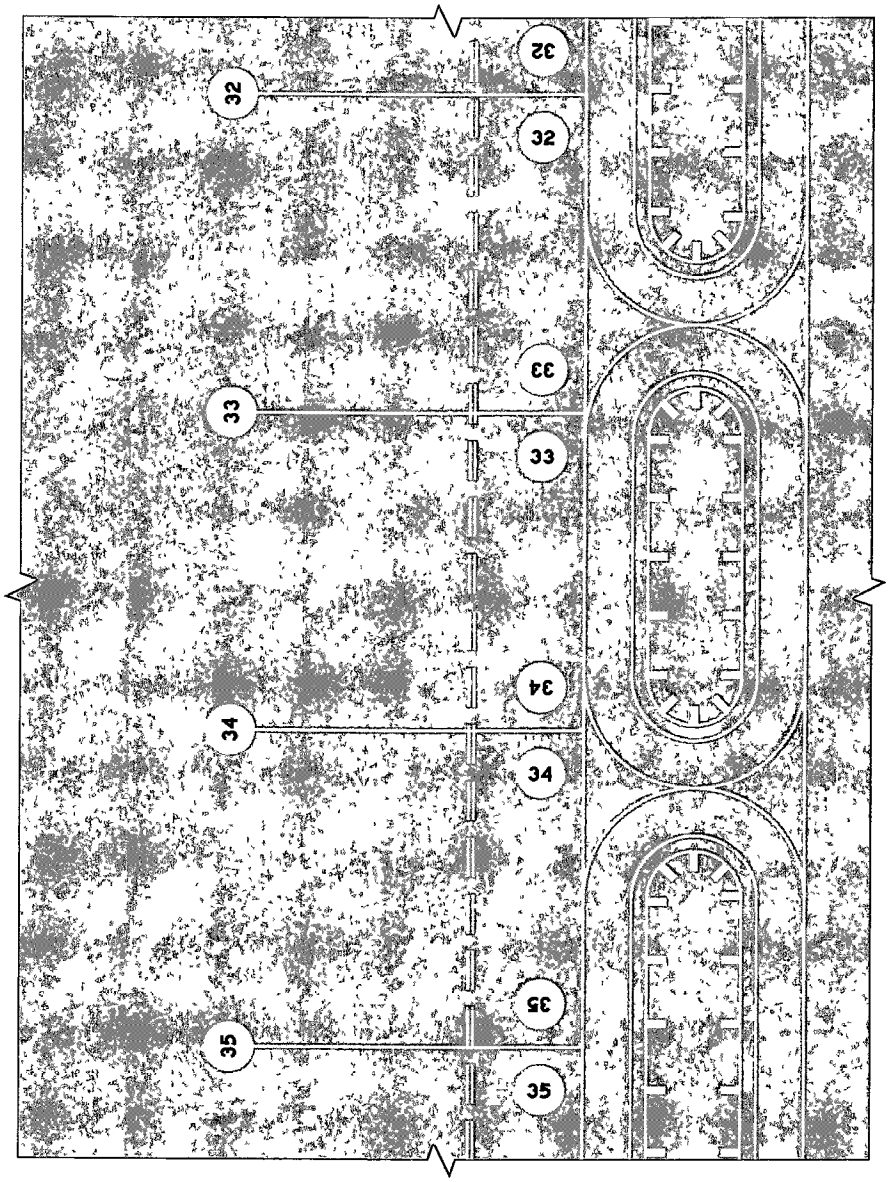
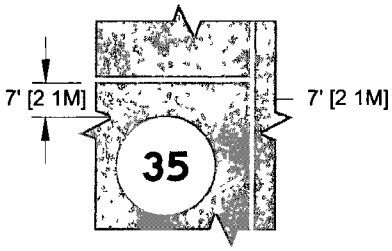


Figure 19. Multiple Gate Signs





NOTE
CENTERLINE AT APRON ENTRANCE POINT LOCATIONS MAY BE MARKED WITH A RADIUS MARKING RATHER WITH A "T" CONFIGURATION AS SHOWN

MEASUREMENTS ARE FROM THE EDGE OF CENTERLINE TO EDGE OF SIGN

Figure 20. Surface Painted Apron Entrance Point Signs

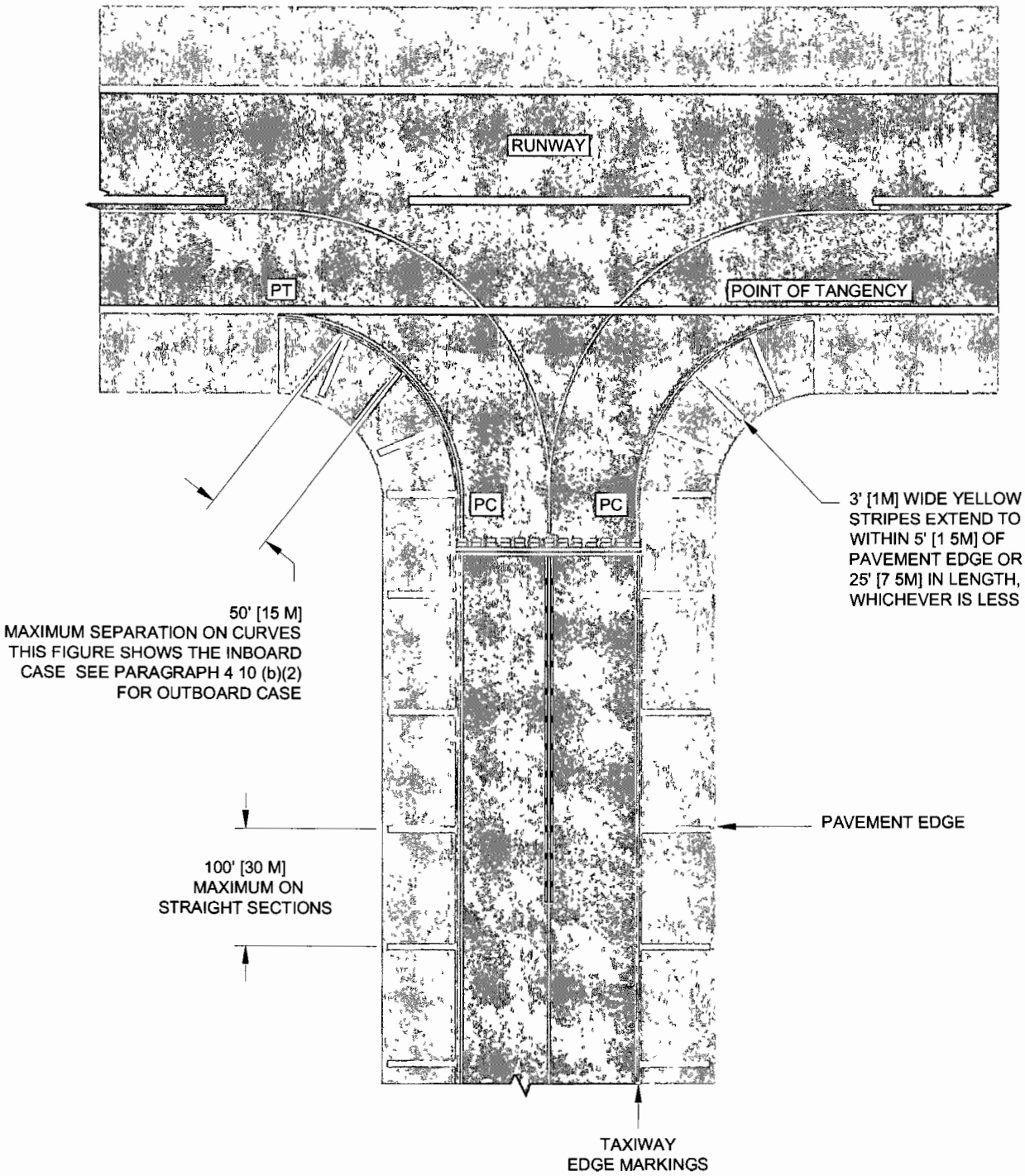


Figure 21. Taxiway Shoulder Markings

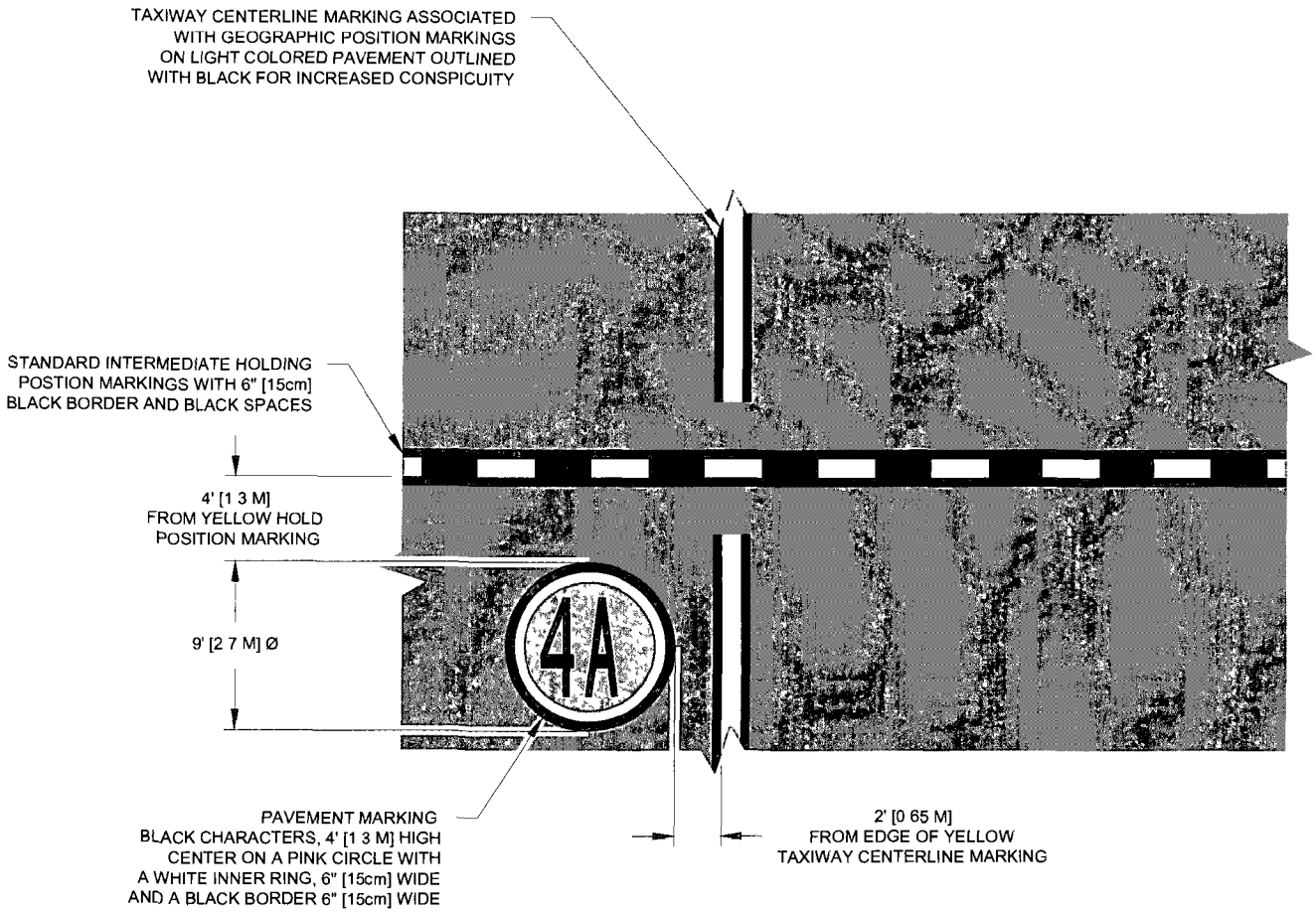


Figure 22. Geographic Position Markings

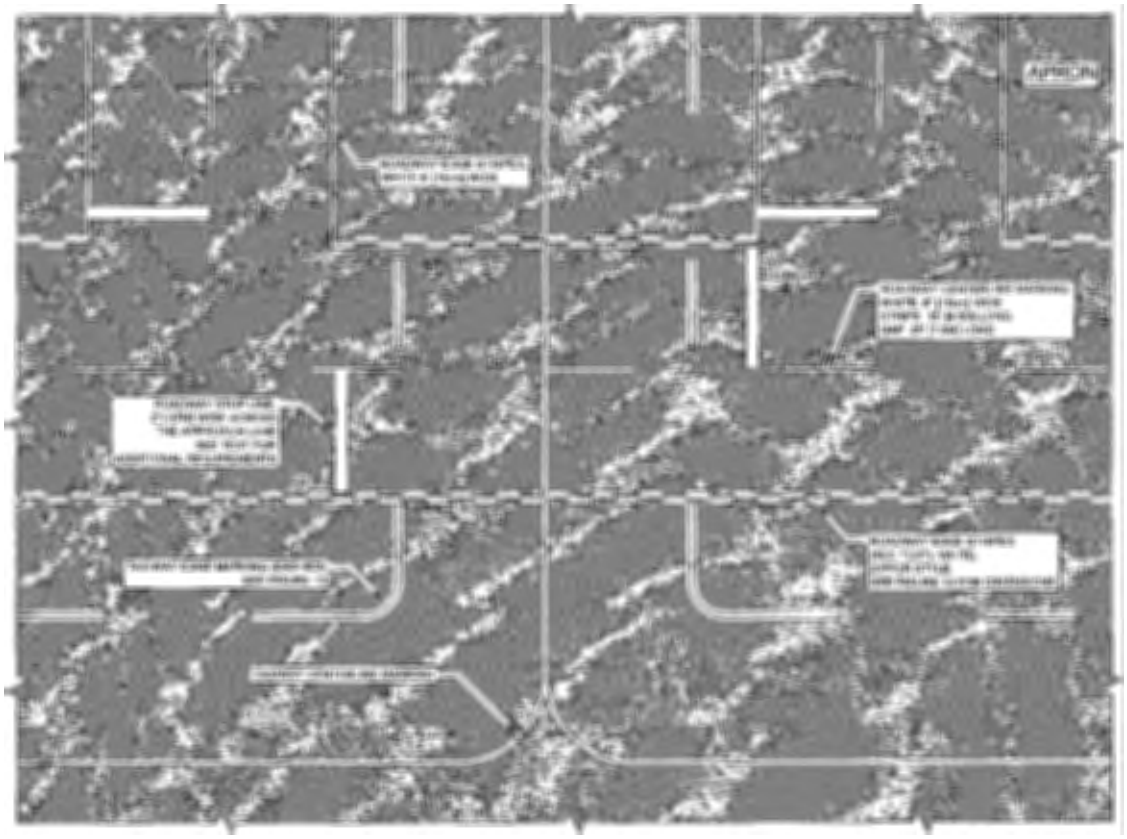
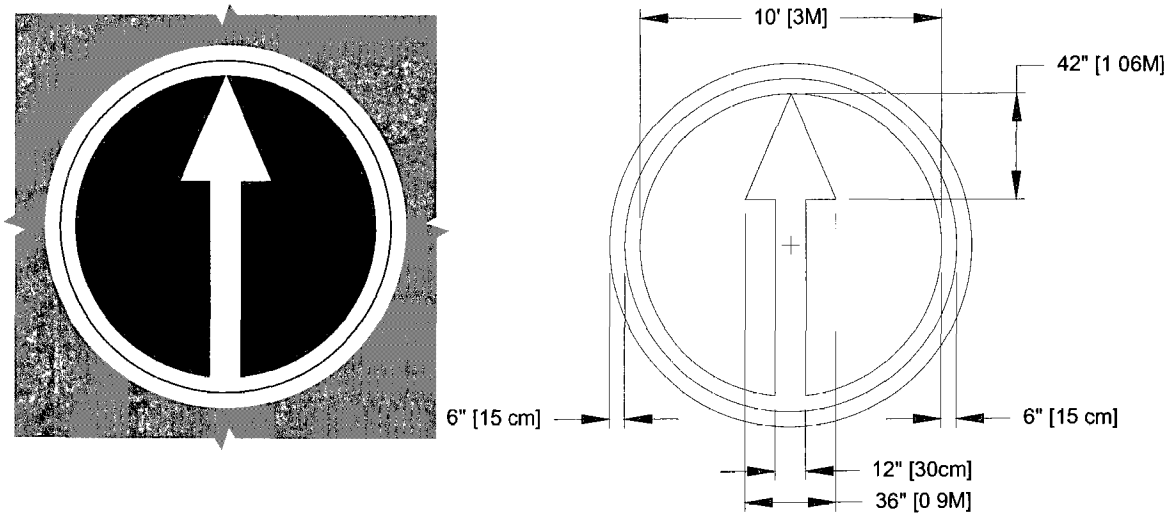


Figure 23. Vehicle Roadway Markings



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" [15cm] BLACK BAND IF NECESSARY FOR CONTRAST

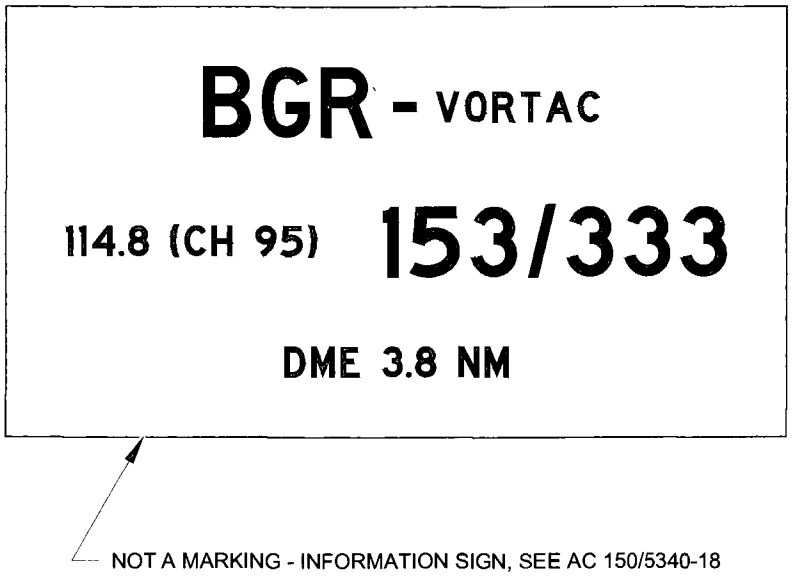
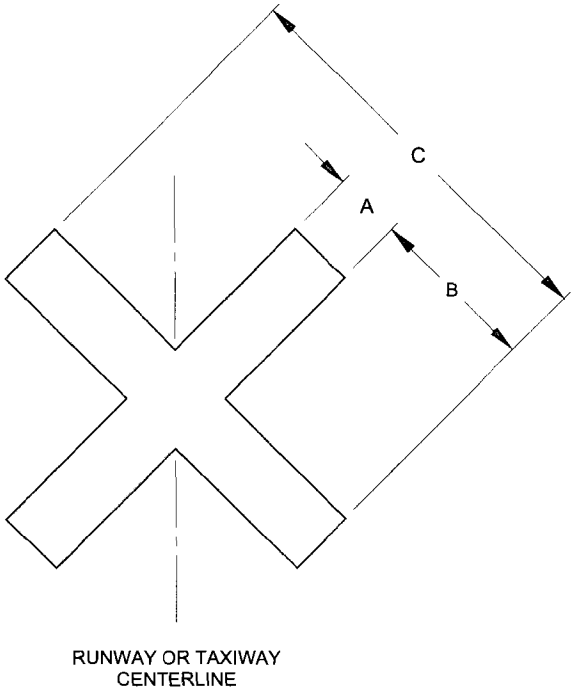
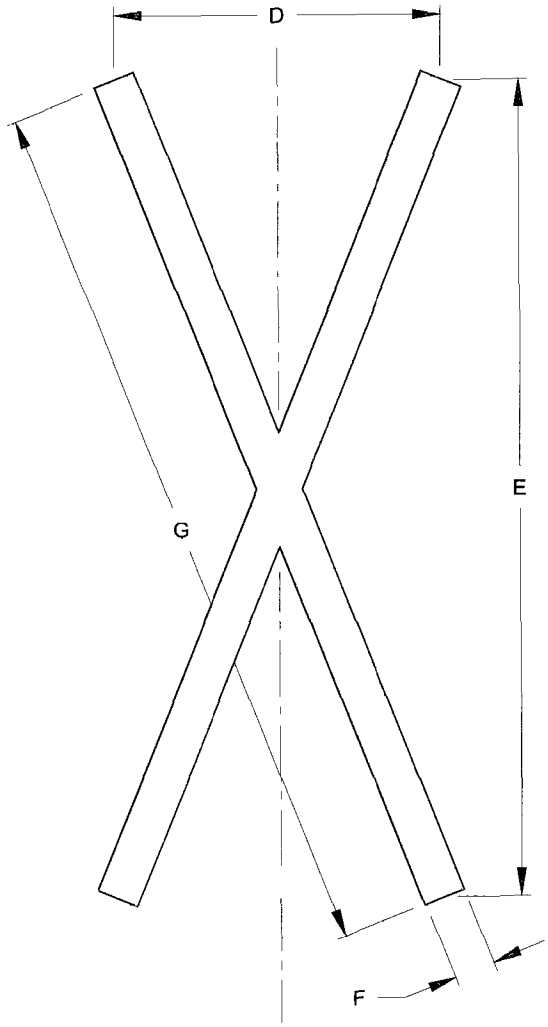


Figure 24. VOR Receiver Checkpoint Markings





NOTE BOTH SYMBOLS ARE ALWAYS PAINTED YELLOW

ALTERNATE

SYMBOL TYPE \ DIMENSION	A	B	C	D	E	F	G
CLOSED RUNWAY	10' [3M]*	25' [7 5M]	60' [18M]	-	-	-	-
CLOSED RUNWAY (ALTERNATE)	-	-	-	48 [14 4M]	120 [36M]	6 [1 8M]	129 25' [39M]
CLOSED TAXIWAY	5' [1 5M]**	12 5' [3 8M]	30' 9M]	-	-	-	-
CLOSED TAXIWAY (ALTERNATE)	-	-	-	24 [7 2M]	60 [18M]	3 [09M]	64 6 [20M]

* FOR TEMPORARY SYMBOL THIS DIMENSION MAY BE CHANGED TO 8' [2 4M]

** FOR TEMPORARY SYMBOL THIS DIMENSION MAY BE CHANGED TO 4' [1 2M]

Figure 25. Closed Runway and Taxiway Markings

APPENDIX A. INSCRIPTIONS FOR SIGNS AND GEOGRAPHIC POSITION MARKINGS

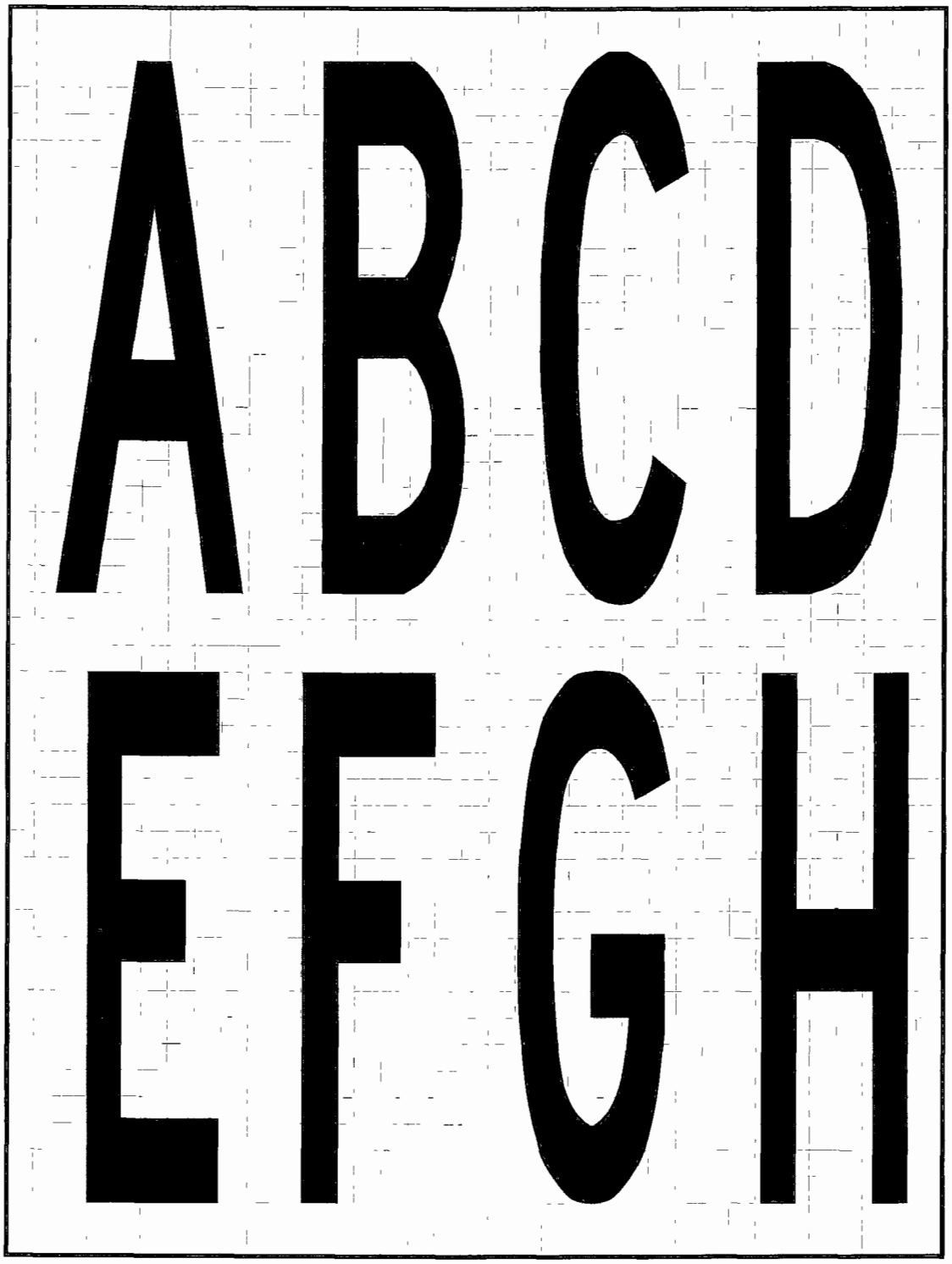


Figure A - 1. Pavement Markings ABCDEFGH

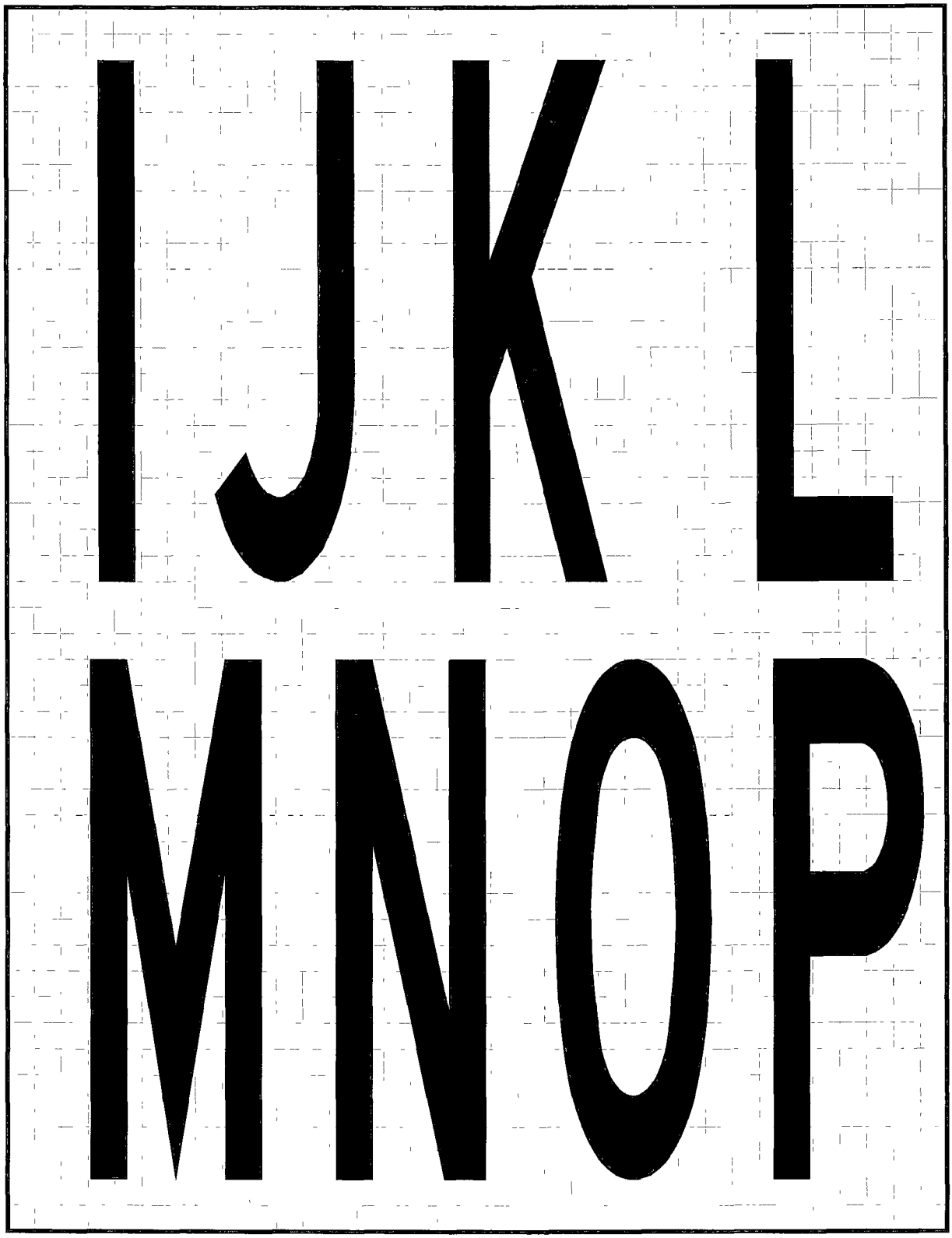


Figure A - 2. Pavement Markings IJKLMNOP

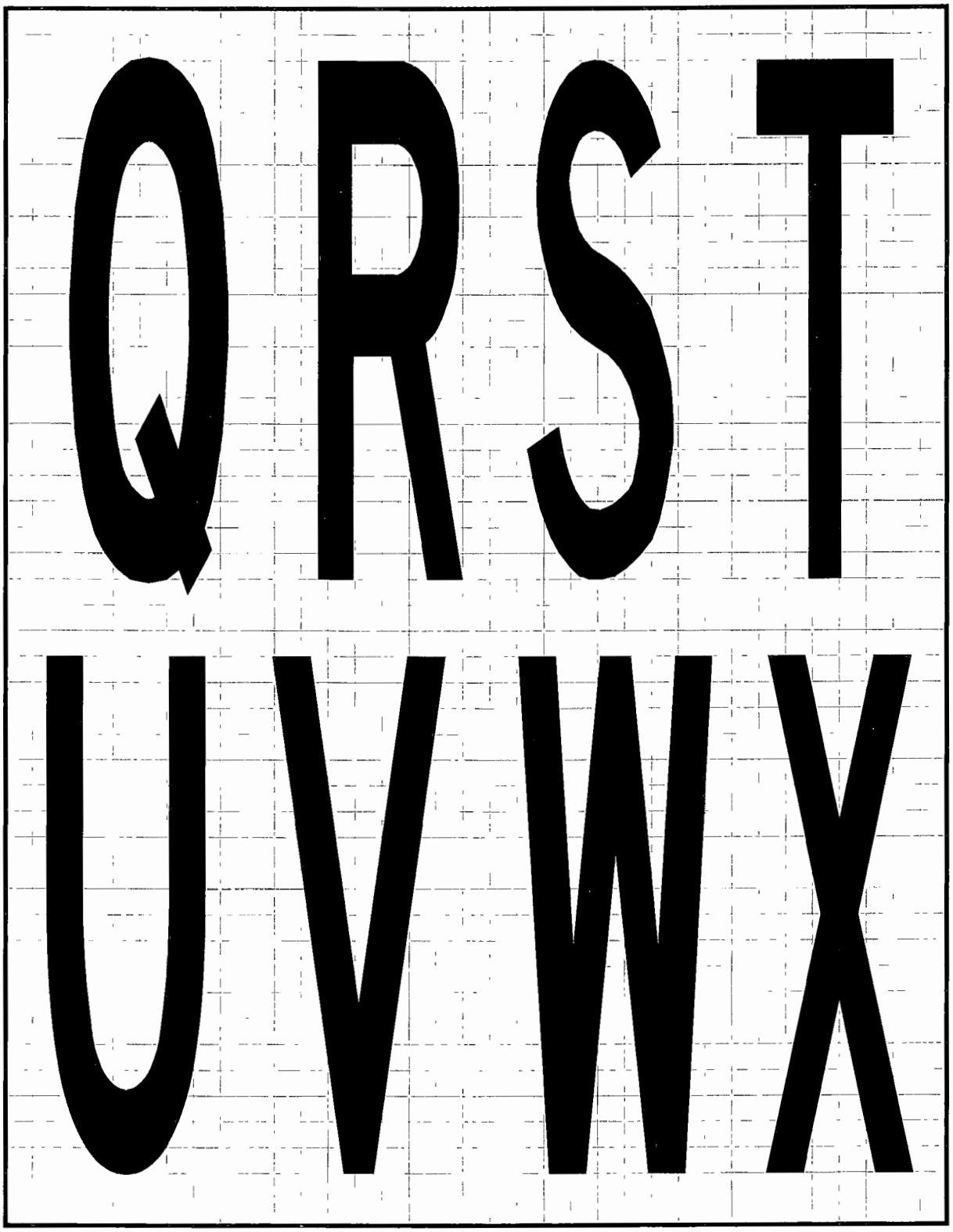


Figure A - 3. Pavement Markings QRSTUVWX

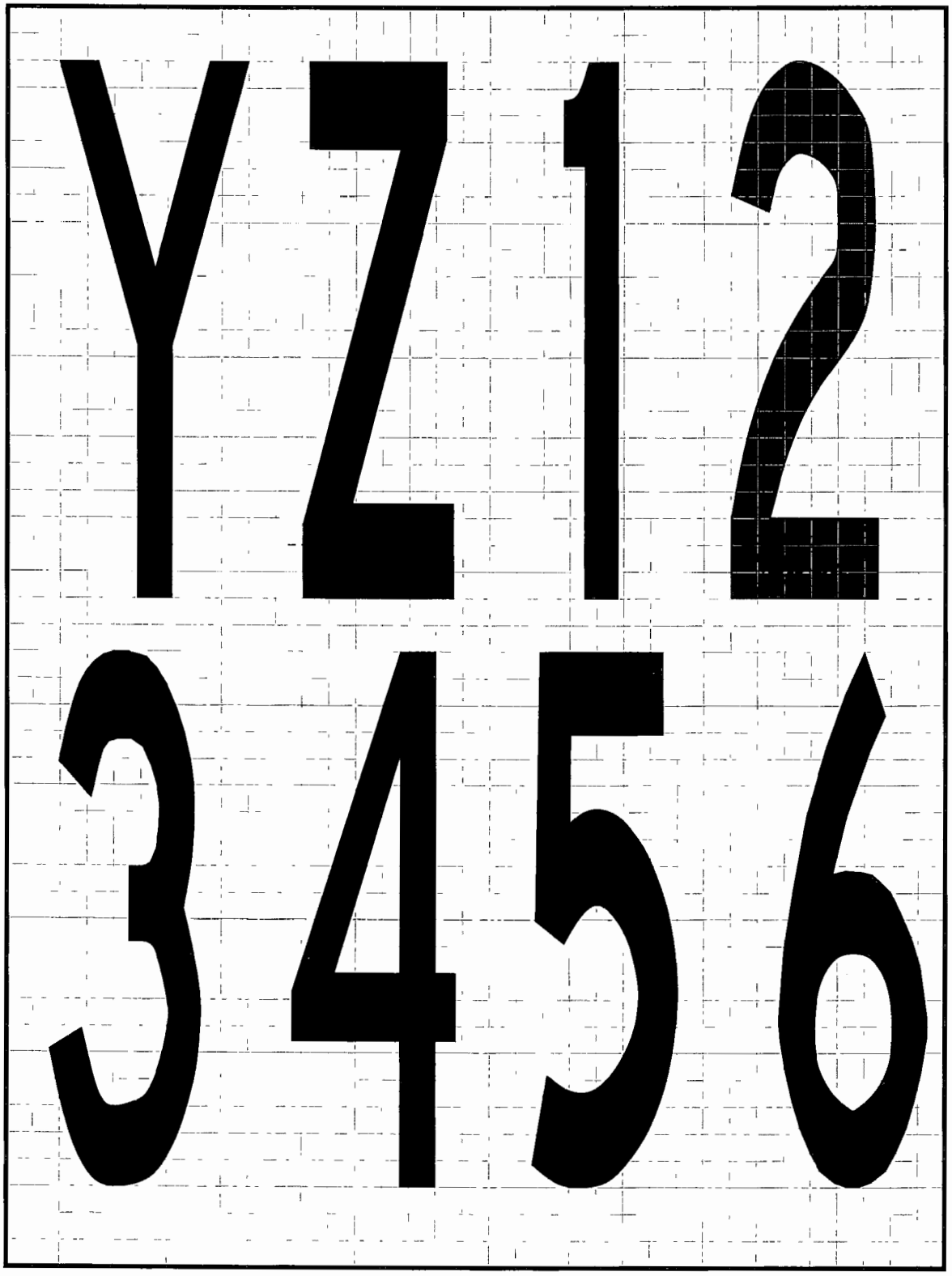


Figure A - 4. Pavement Markings YZ123456

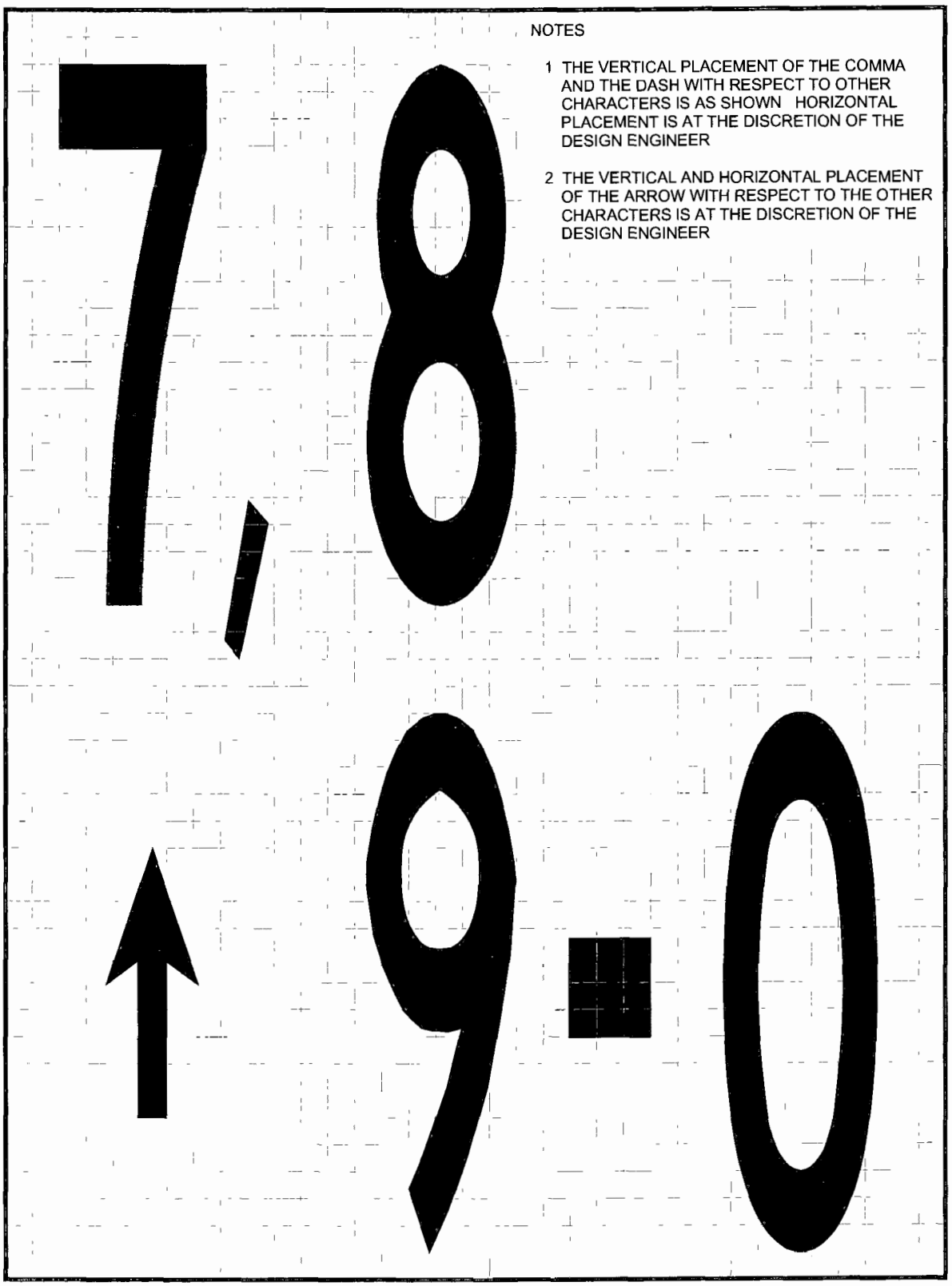


Figure A - 5. Pavement Markings 7890-,↑

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APPENDIX B. 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 B - 1. Runway Holding Position Marking

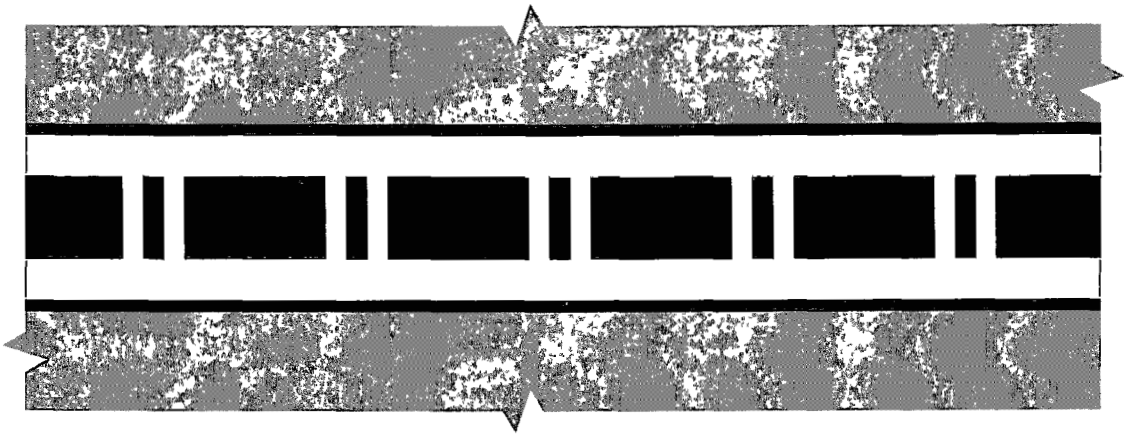

Figure B - 2. ILS/MLS Holding Position Marking

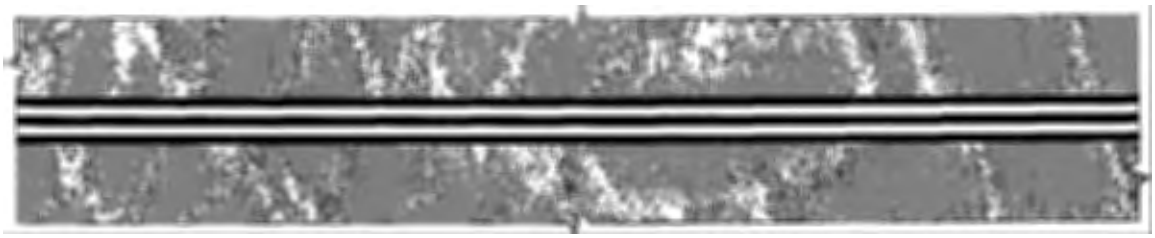

Figure B - 3. Continuous Taxiway Edge Line Marking

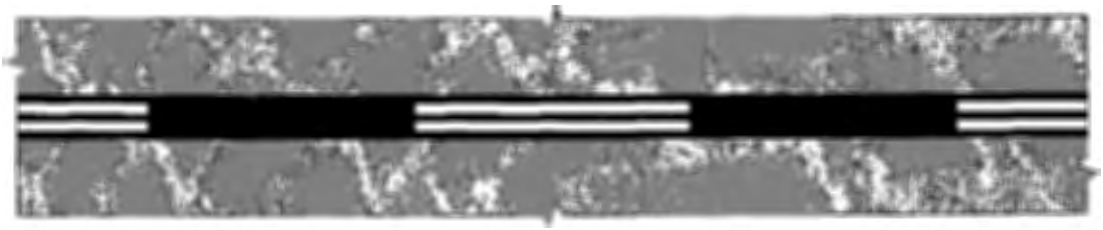

Figure B - 4. Dashed Taxiway Edge Line Marking

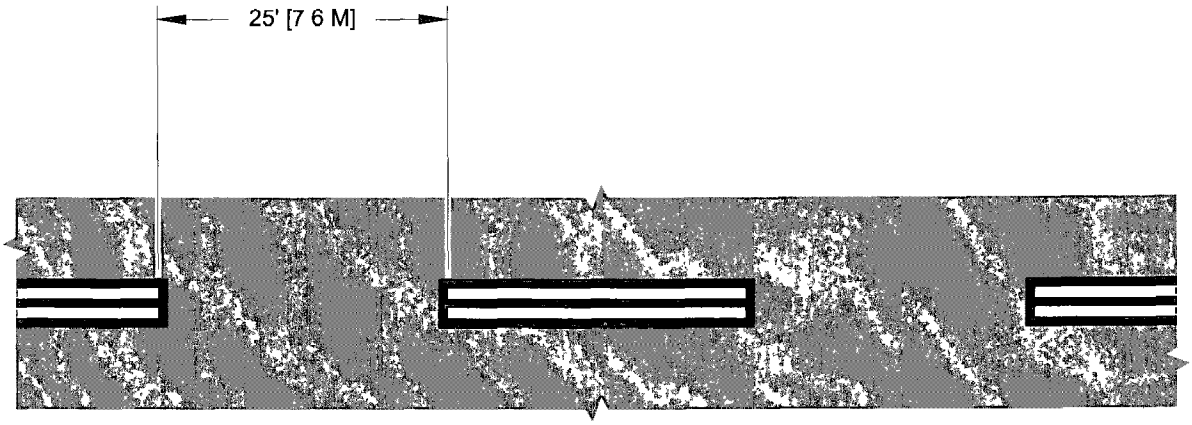

Figure B - 5. Alternate Outlining Method for Dashed Taxiway Edge Line Marking

Figure B - 6. Taxiway Centerline Marking

Figure B - 7. Intermediate Holding Position Markings

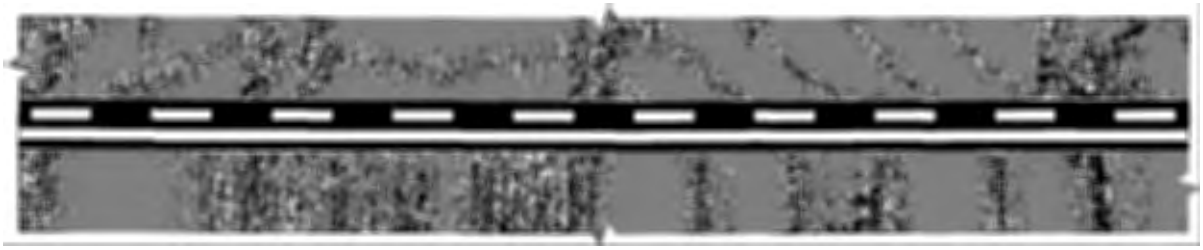

Figure B - 8. Non-movement Area Boundary Marking

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APPENDIX C. ENHANCED MARKINGS FOR RUNWAY HOLDING POSITION

1. GENERAL.

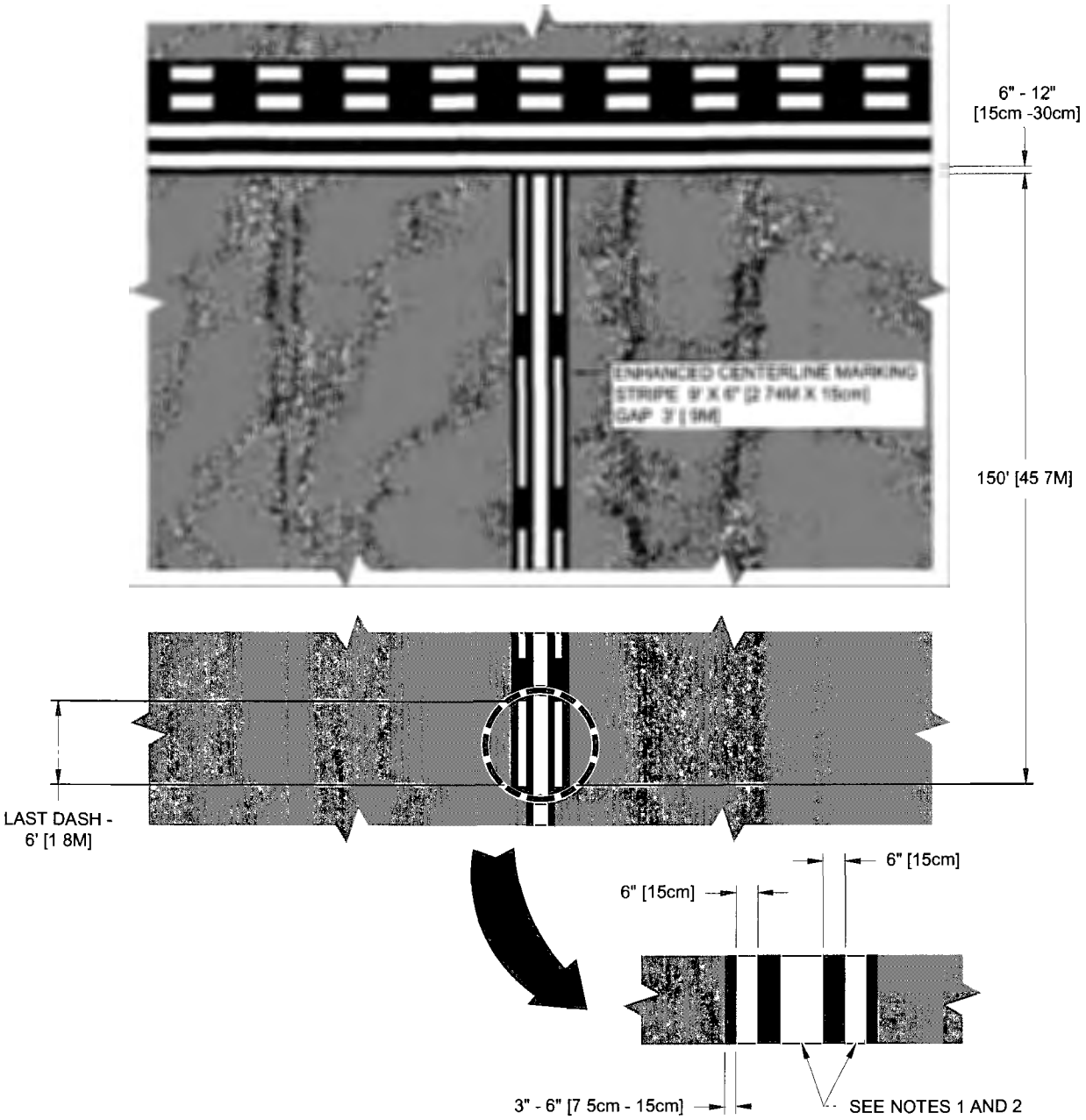
Enhanced taxiway markings are intended to provide additional visual cues to taxiing pilots to help them identify the location of the runway holding position. This appendix provides standards for these enhanced markings and guidance, including examples, on where to use the enhanced markings.

The figures included in this appendix are not drawn to scale

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

3. ENHANCED TAXIWAY CENTERLINE MARKINGS.

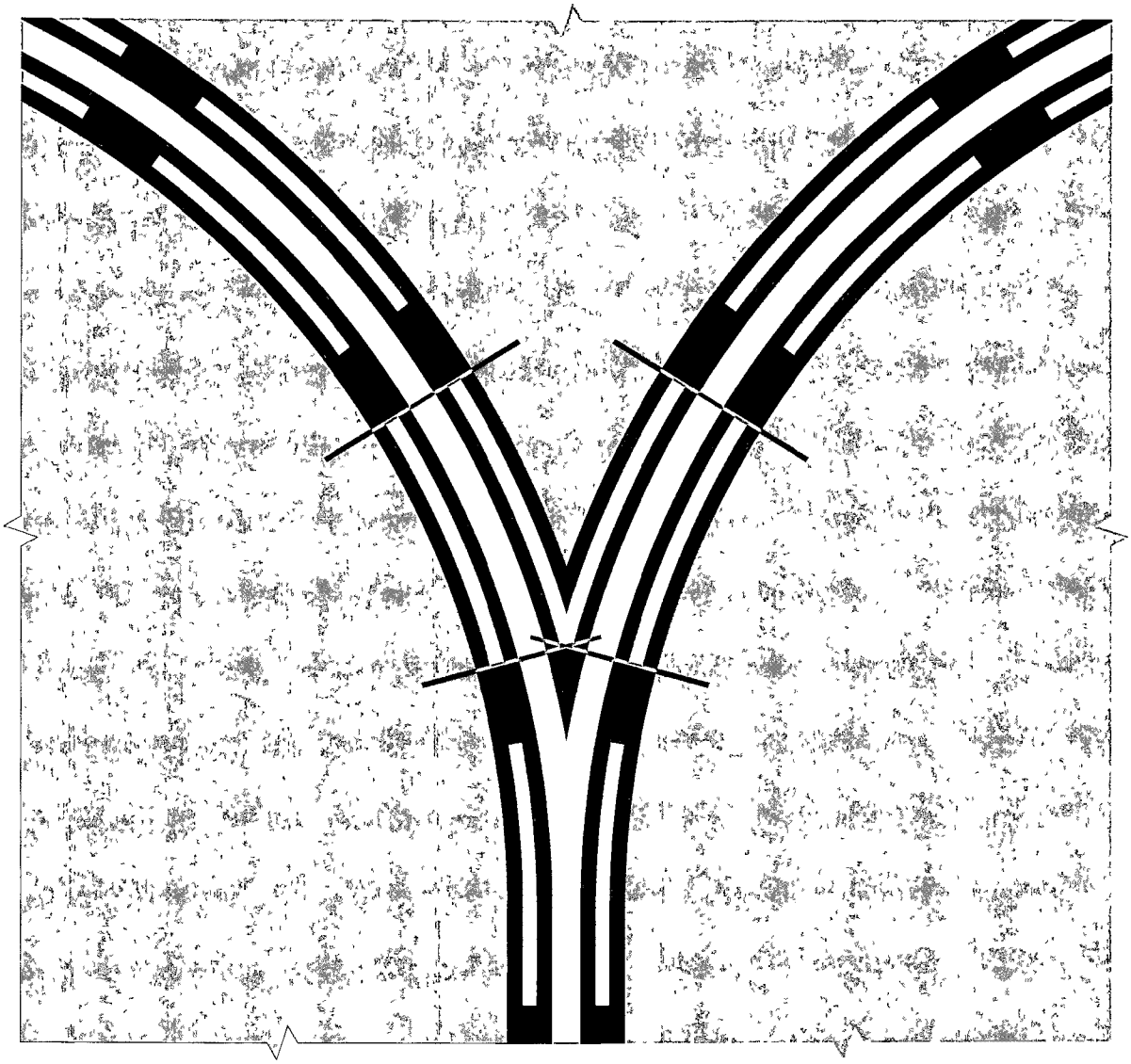


NOTES

1 DASHED LINES FOR THE ENHANCED TAXIWAY CENTERLINE MARKING ARE 6" [15cm] IN WIDTH AND SEPARATED 6" [15cm] FROM THE TAXIWAY CENTERLINE THIS APPLIES TO BOTH 6" [15 cm] AND 12" [30 cm] TAXIWAY CENTERLINE MARKINGS

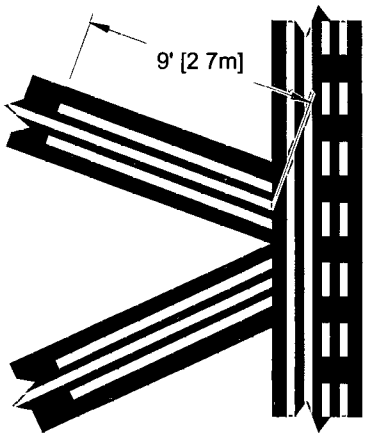
2 THE TAXIWAY CENTERLINE MARKINGS MAY BE SHIFTED LEFT OR RIGHT TO AVOID INTERFERENCE WITH THE TAXIWAY CENTERLINE LIGHTS

Figure C - 1. Enhanced Taxiway Centerline Markings



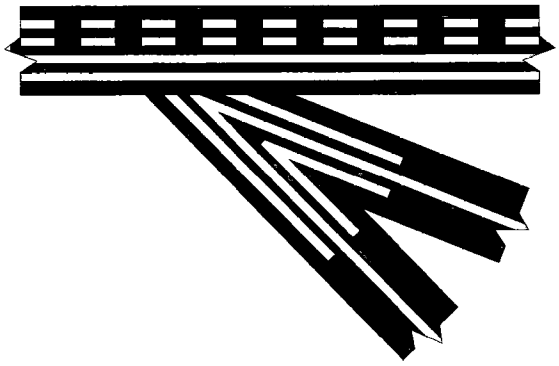
NOTE
AS SHOWN IN THIS CASE THE V -SHAPED INNER DASHES START AND STOP WITH THE OUTSIDE 9 FOOT [3 M] DASHES HOWEVER THIS MAY NOT ALWAYS BE THE CASE FOR THE INNER DASHES IF THE V-SHAPED ARE LESS THAN 5 FEET [1 5 M] THEY MAY BE OMITTED

Figure C - 2. Dashed Lines at Converging Taxiway Centerlines

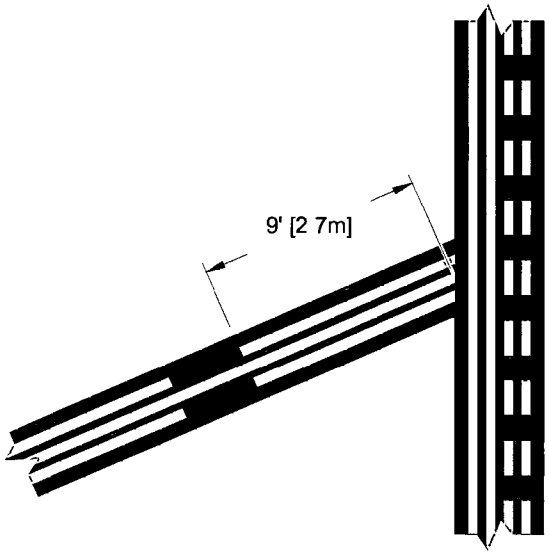


DETAIL A
Example of two straight enhanced taxiway centerline markings intersecting the runway holding position marking

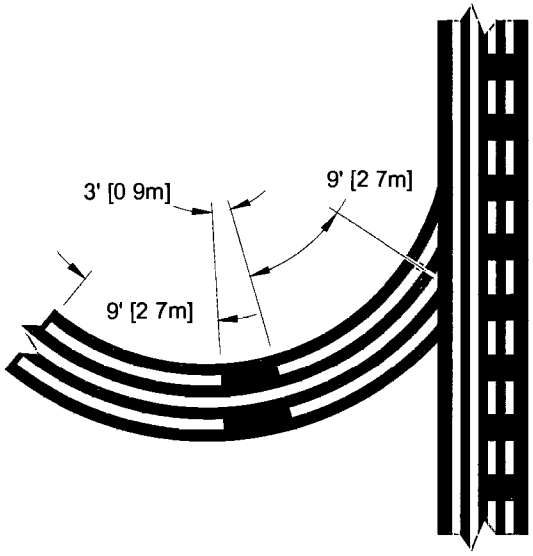
PARTIAL INNER DASHES INCLUDED BECAUSE THEY EXCEED 5 FEET IN LENGTH ACCEPTABLE TO OMIT ANY DASHES THAT ARE LESS THAN 5' [1 5m] IN LENGTH



DETAIL B
Example of converging enhanced taxiway centerline markings intersecting at an angle of less than 90° with runway holding position marking



DETAIL C
Example of straight enhanced taxiway centerline markings intersecting with runway holding position marking



DETAIL D
Example of curved enhanced taxiway centerline markings intersecting with runway holding position marking

NOTE ALL MEASUREMENTS ARE TAKEN ALONG THE CENTER OF THE CENTERLINE.

Figure C - 3. Converging, Straight, and Curved Enhanced Taxiway Centerlines Intersecting with Holding Position Marking

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 C-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 ADG V For taxiways wider than 75 feet (22.9 m) 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.

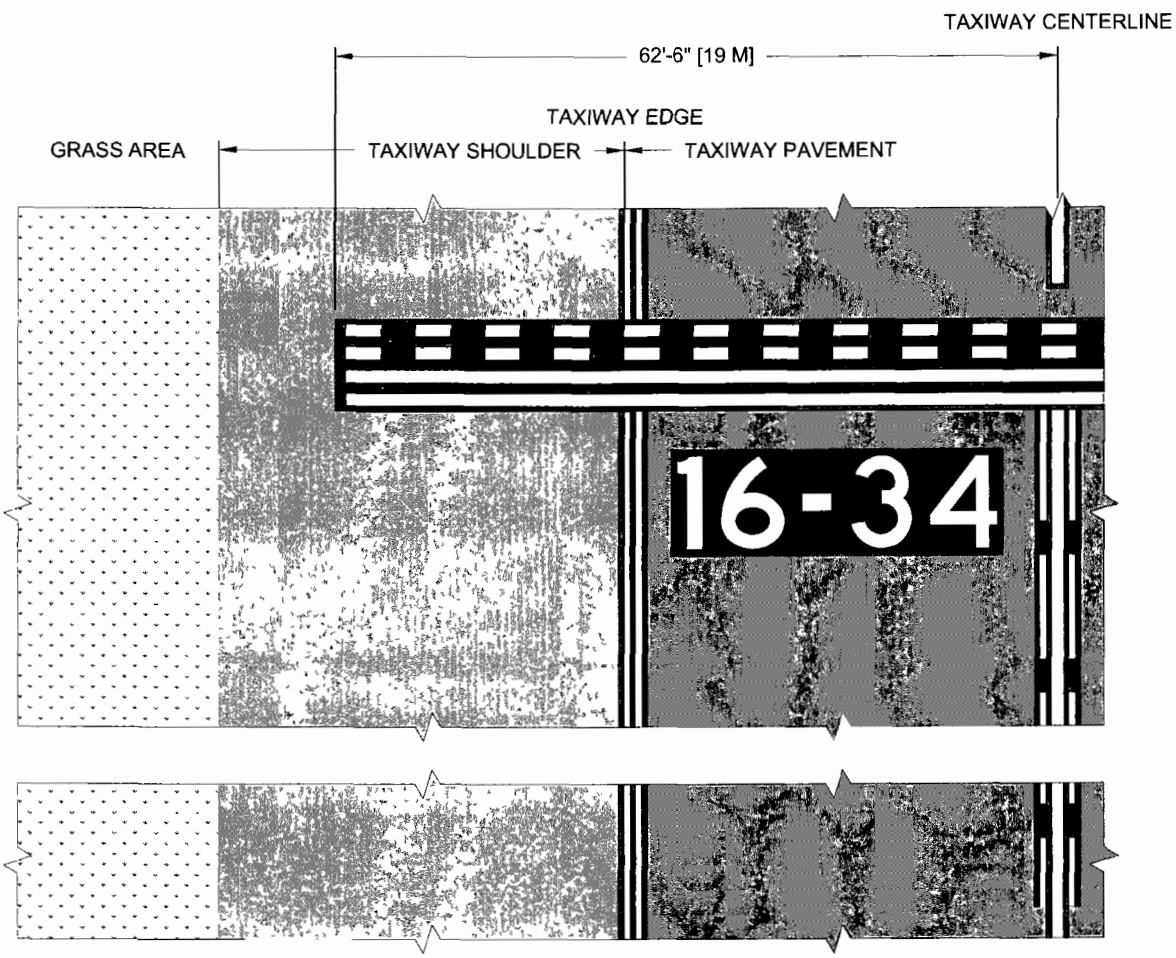


Figure C - 4. Enhanced Runway Holding Position Markings on Taxiways

5. SURFACE PAINTED HOLDING POSITION SIGNS.

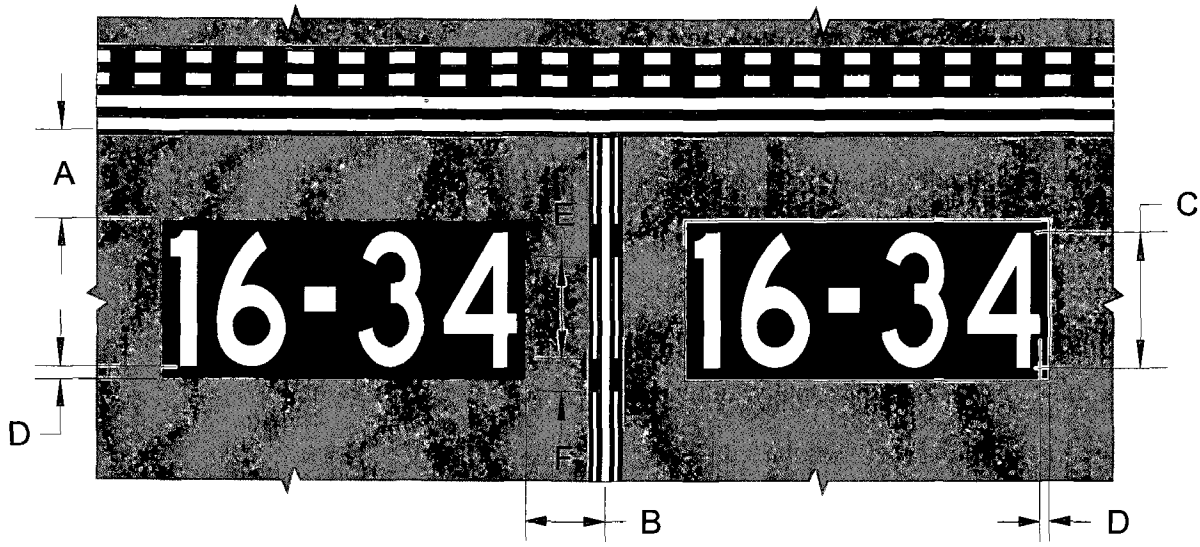


Figure C - 5. Surface Painted Holding Position Signs for Taxiway Widths Greater Than 35 Feet (10.5 m)

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 A 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)	

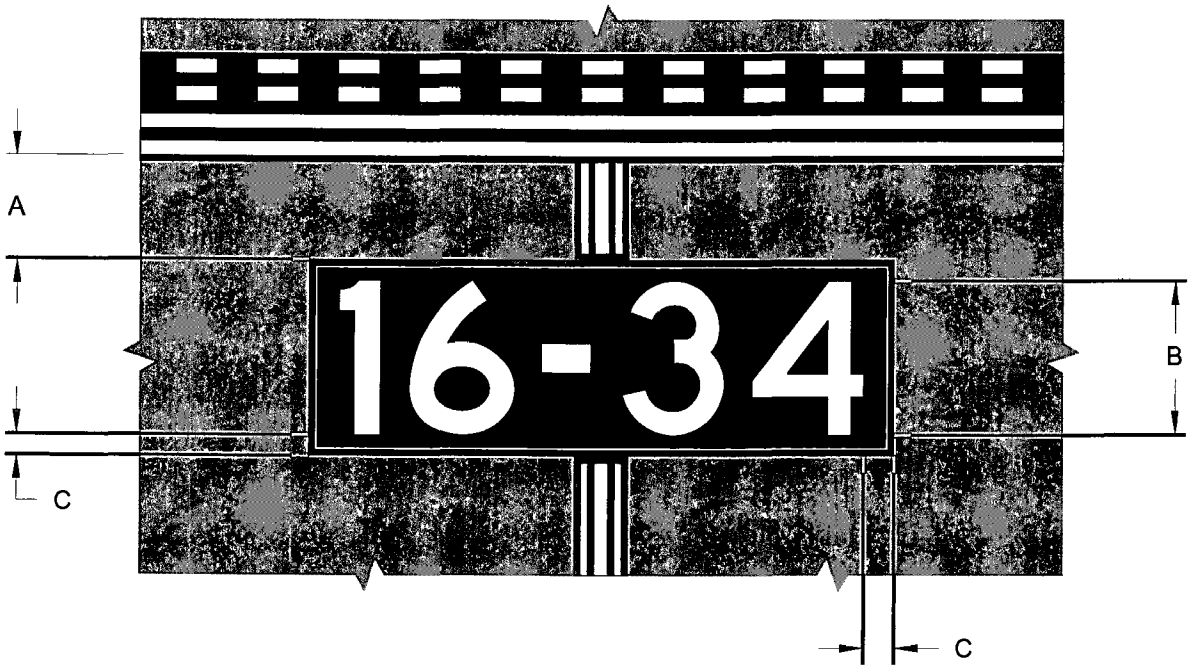


Figure C - 6. Surface Painted Holding Position Sign for Taxiway Widths Equal to or Less Than 35 Feet (10.5 m)

Dimension Letter	Dimension feet (meters)	Notes
A	2 – 3 (0 67 – 0 91)	
B	6 (1 8)	Inscriptions follow Appendix A inscription criteria The size of the sign inscription is scaled to fit taxiways 35 feet (10 5 m) or less in width for Airplane Design Groups I and II Reference AC 150/5300-13. 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 A 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. For practicality, the lowest height reduction is 3 feet (0 91 m)
C	7 5 in (19 cm)	
NOTE		The dimensions for the enhanced taxiway centerline are in Figure C-1 The spacing between the enhanced taxiway centerline and the surface painted holding position sign is 6 -12 inches (15 – 30 cm) see figure C-1.

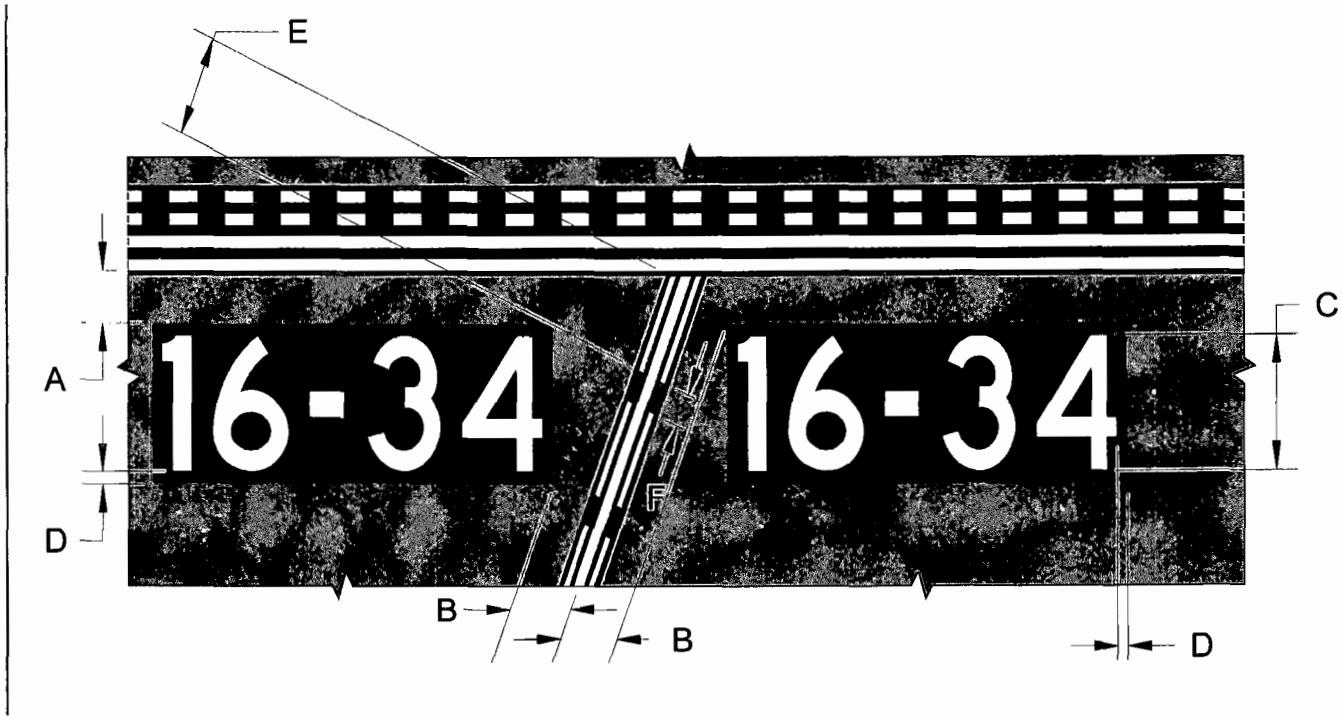


Figure C - 7. Surface Painted Holding Position Signs when Taxiway Centerline is not Perpendicular to Runway Holding Position Marking

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 A 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)	

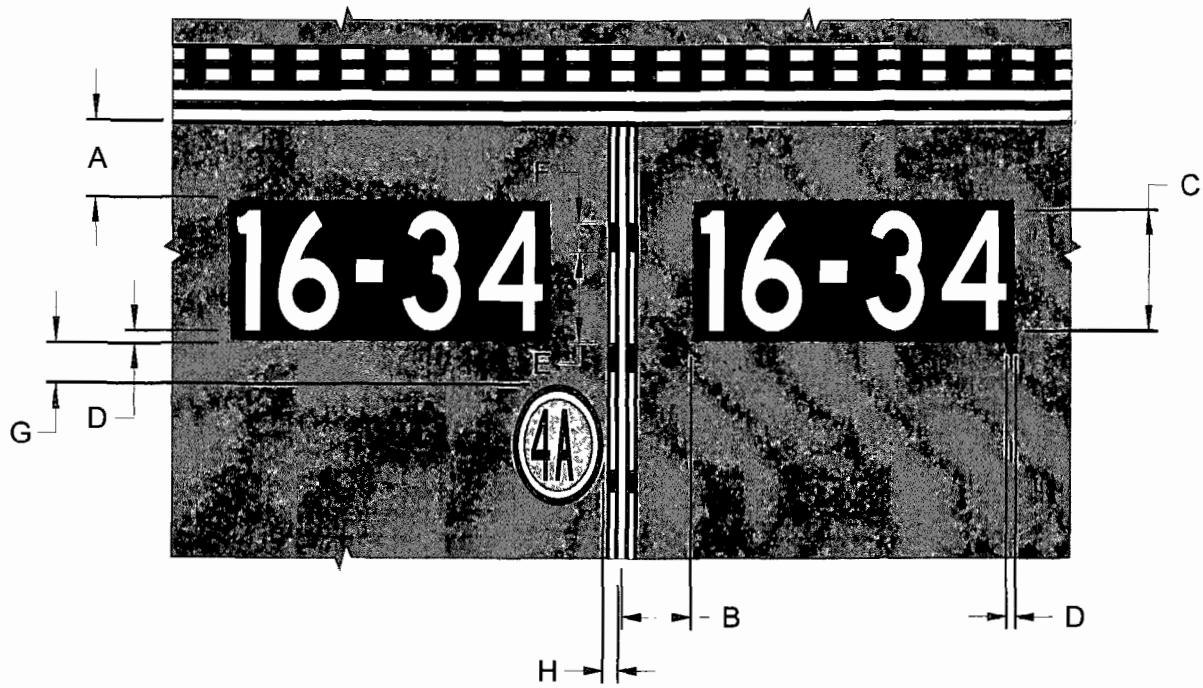


Figure C - 8. Surface Painted Holding Position Signs Co-Located with Geographic Position Marking

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 Appendix A 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

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 C-9, only one sign on either side of the two taxiway centerlines is practical.

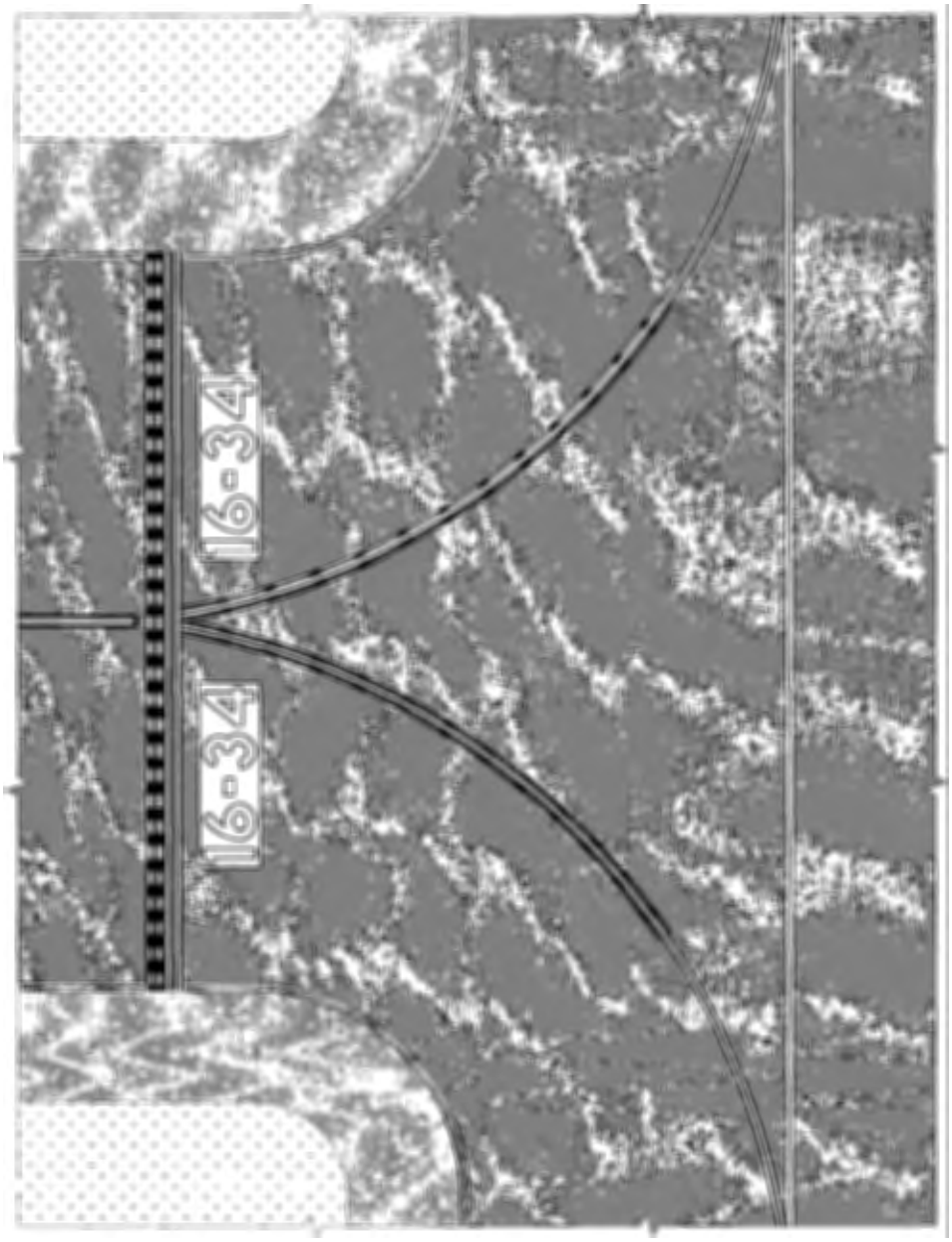


Figure C - 9. Two Taxiway Centerlines Converging at a Runway Holding Position Marking

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 C-10.

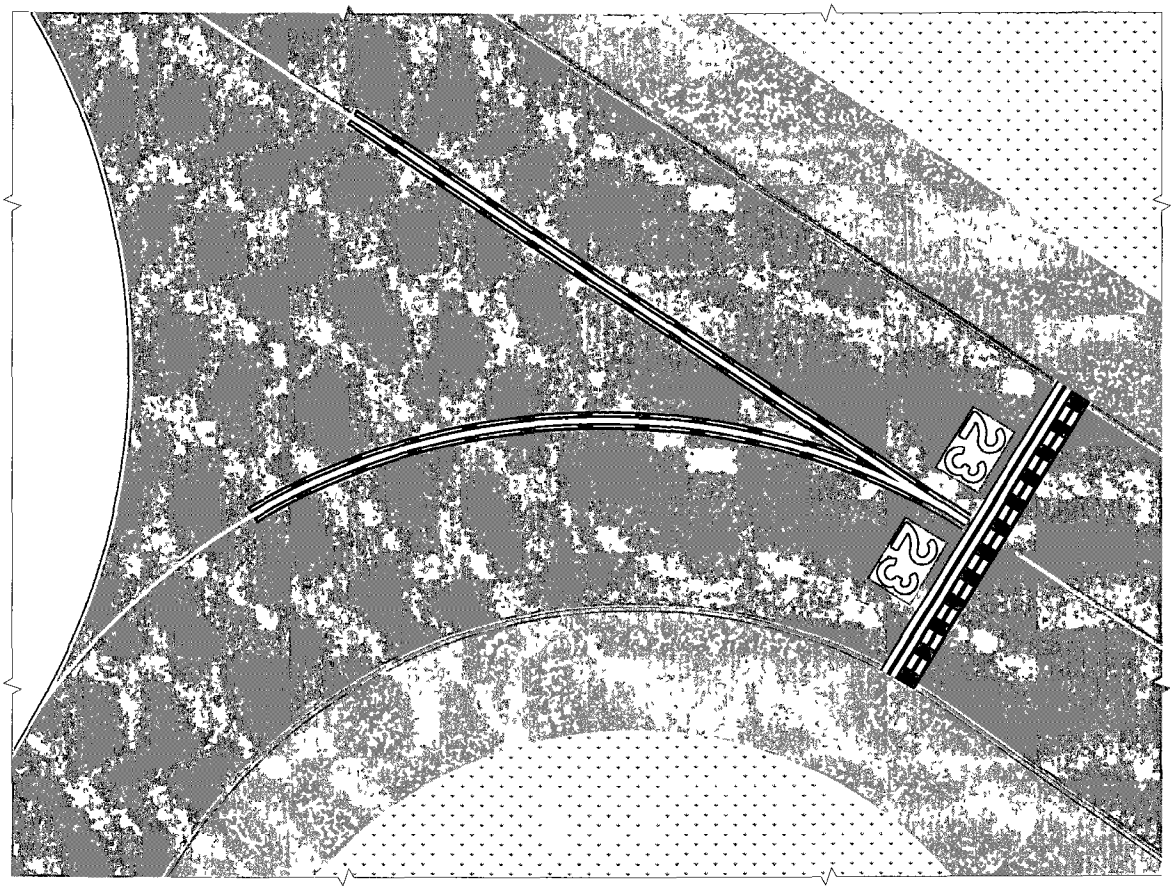
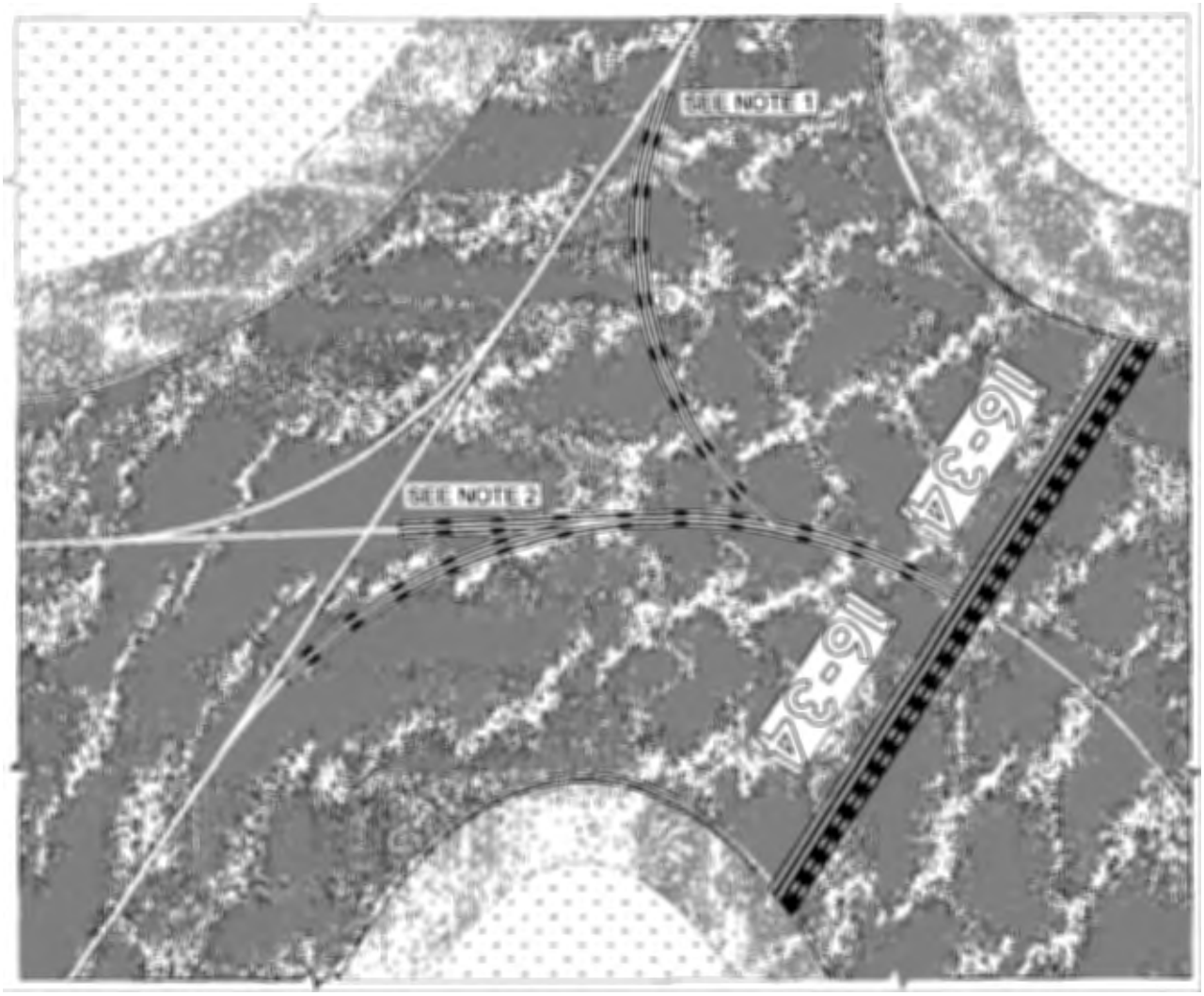


Figure C - 10. Intersection of Two Taxiways at Runway End

c. Intersection of Three Converging Taxiway Centerlines. Figure C-11 illustrates taxiway centerline configurations when there are three converging centerlines.



NOTES

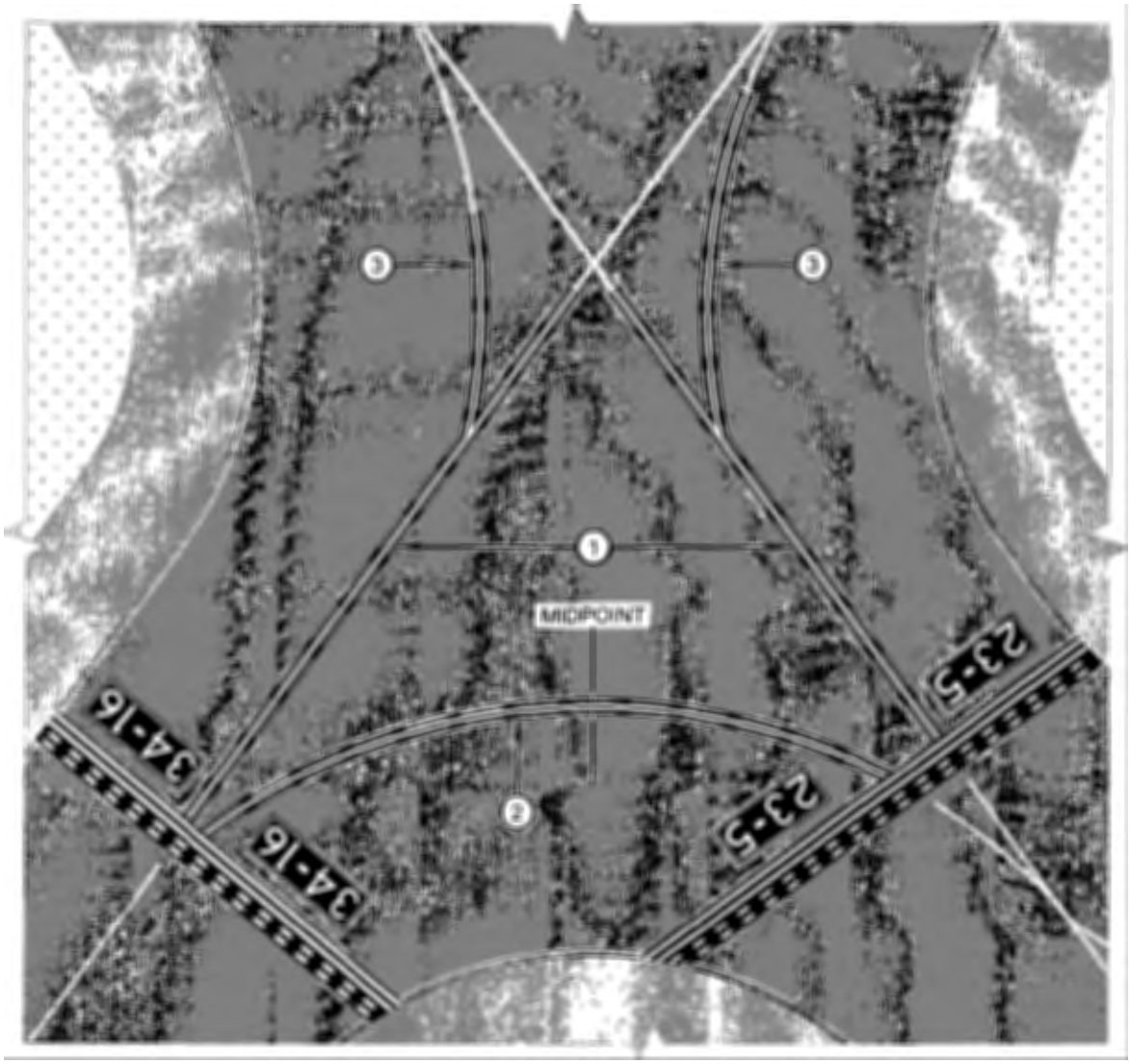
1 ENHANCEMENT IS TANGENT TO MERGING CURVE

2 ENHANCEMENT TERMINATES 5 FEET [1 5m] FROM INTERSECTION

Figure C - 11. Intersection of Three Converging Taxiway Centerlines

d. Intersection of Multi-Taxiway Centerlines with Less than 150 Feet (45.7 m) Between Taxiways. Figure C-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 3d)

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 3d)

3 Illustrates a converging taxiway centerline curving toward two runway holding positions

Figure C - 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 C-13 illustrates an angled runway holding position marking that is intersected by two taxiway centerlines.

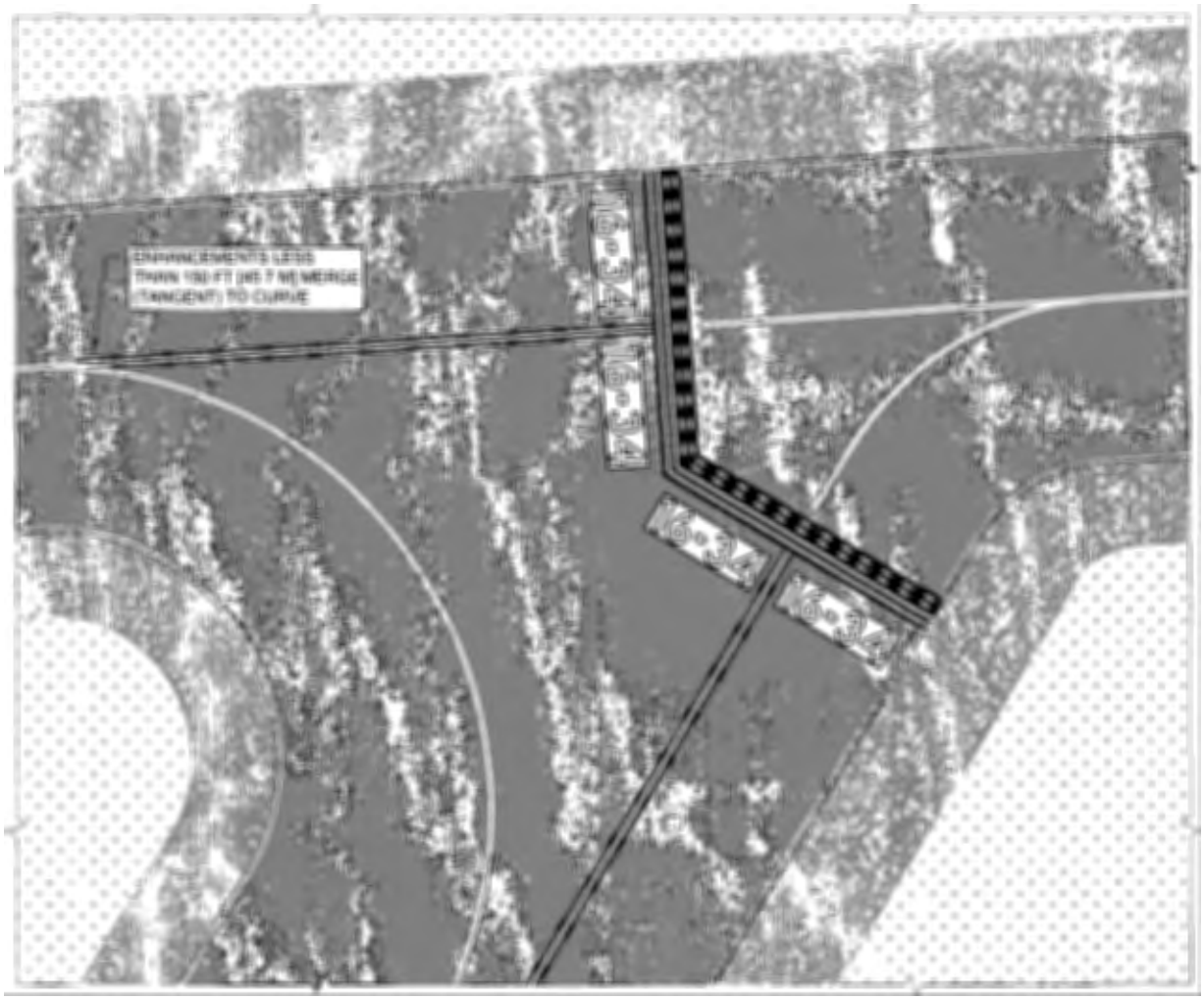


Figure C - 13. Two Taxiway Centerlines Intersecting a Runway Holding Position Marking

f. Intersection of Stub Taxiway and Runway. Figure C-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 4.3d, the enhancement terminates 5 feet (1 5 m) from a taxiway/taxiway intersection.

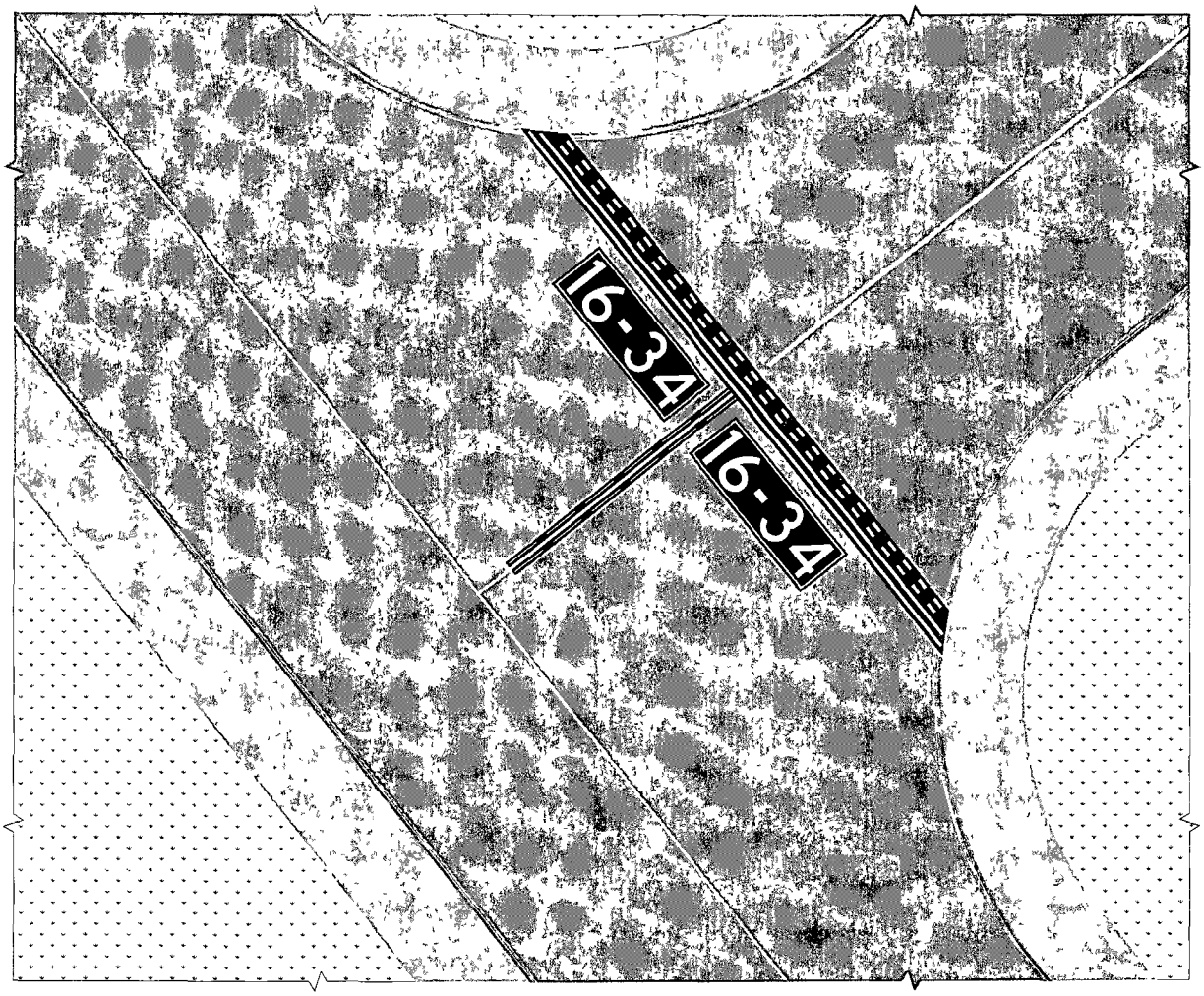
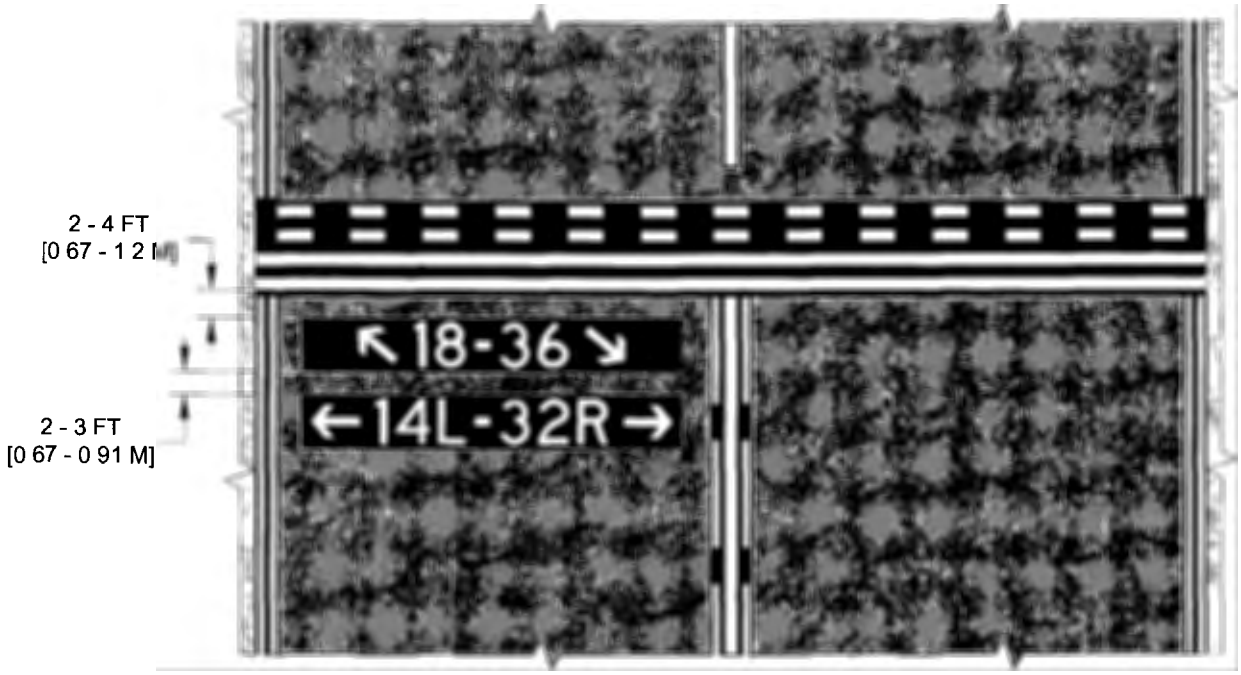


Figure C - 14. Intersection of Stub Taxiway and Runway



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

Figure C - 15. Narrow Taxiway Stacked Surface Painted Holding Position Sign

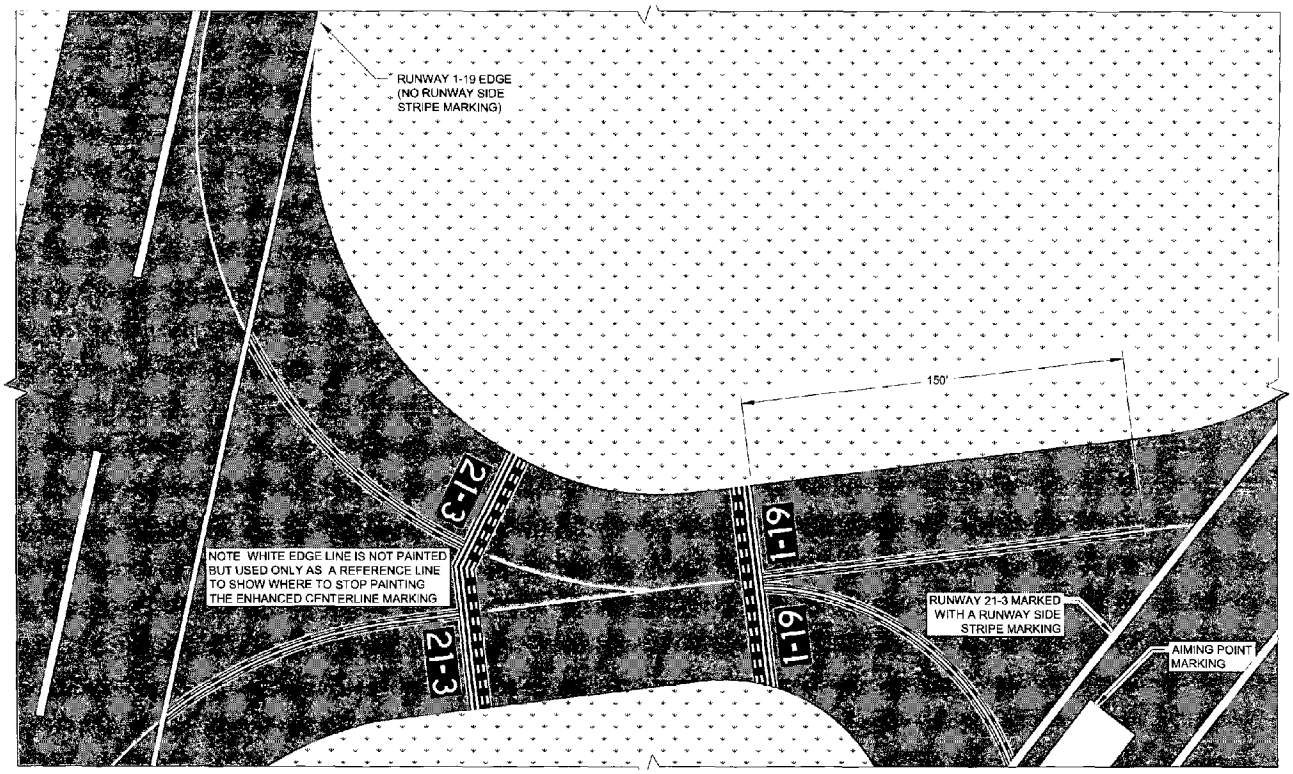
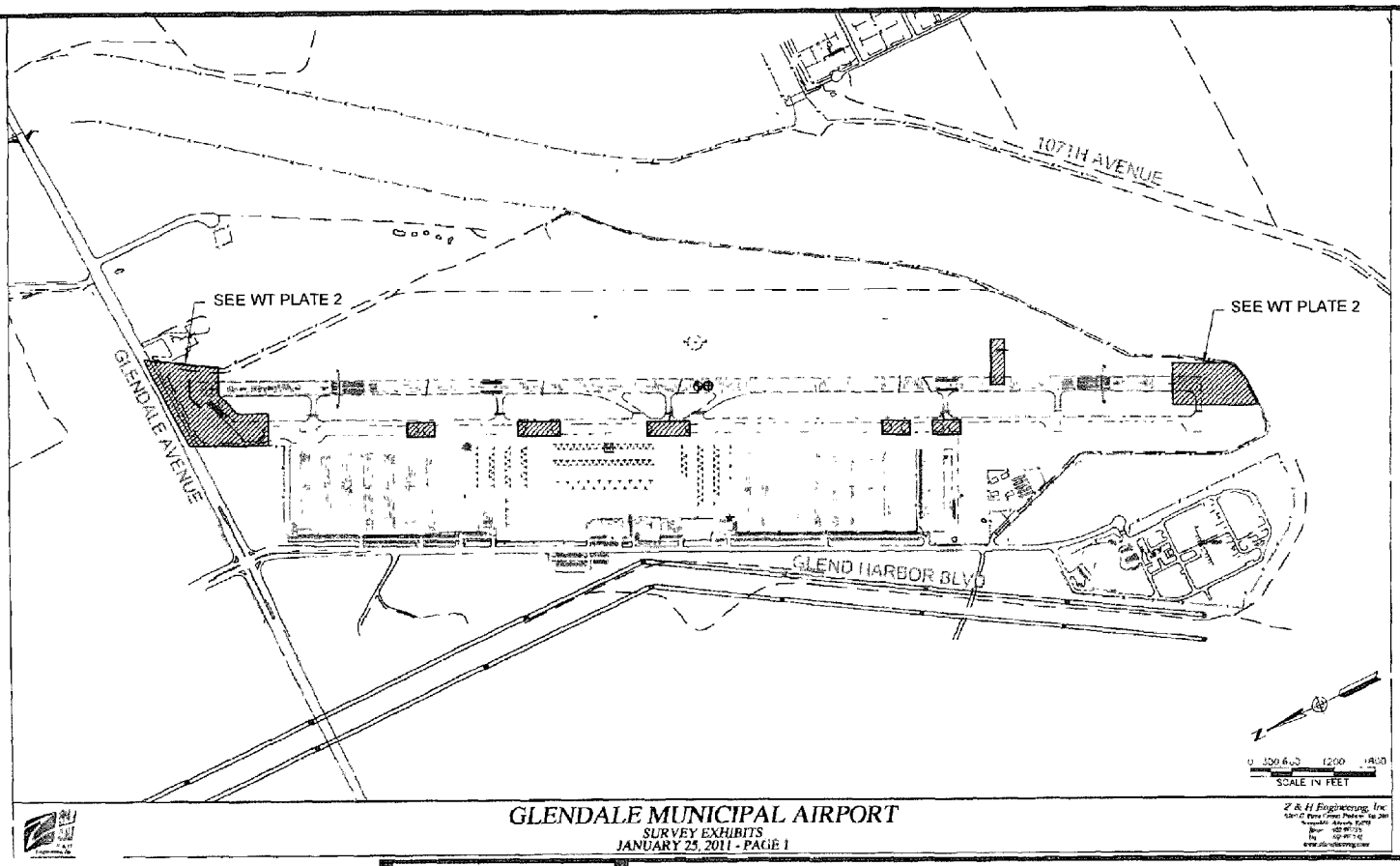


Figure C - 16. Enhanced Taxiway Centerlines When a Taxiway Connects Closely Spaced Runways

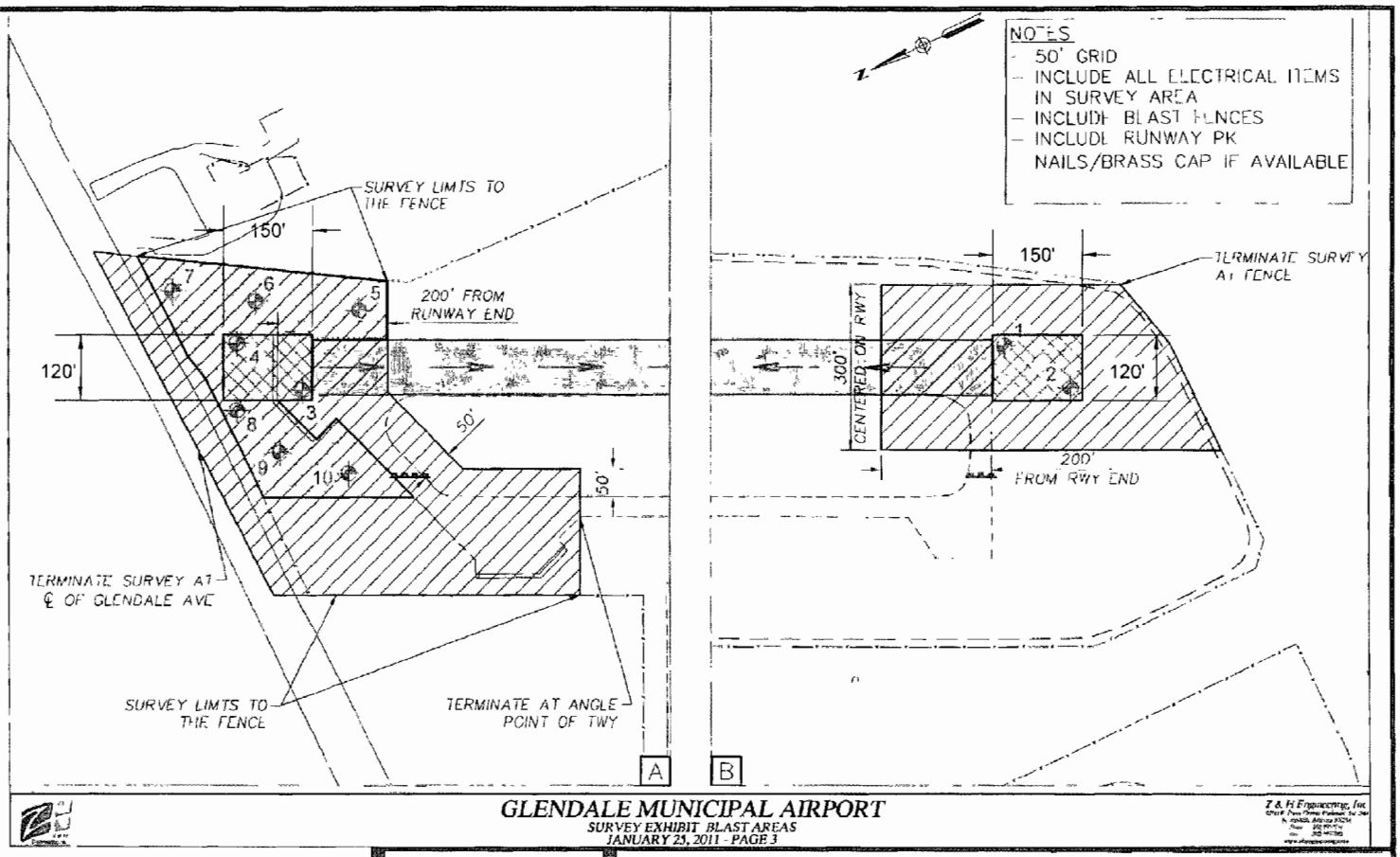
Blank Page



Western Technologies Inc.

PLATE 1. **SITE PLAN**
Blast Pads
Glendale Airport
Glendale, Arizona

WT Job No 2121JA065



LEGEND

⌖ Approximate Boring Location

Western Technologies Inc.

PLATE 2. **BORING LOCATION DIAGRAM**
Blast Pads
Glendale Airport
Glendale, Arizona

WT Job No 2121JA065

Allowable Soil Bearing Capacity	The recommended maximum contact stress developed at the interface of the foundation element and the supporting material
Backfill	A specified material placed and compacted in a confined area.
Base Course	A layer of specified material placed on a subgrade or subbase
Base Course Grade	Top of base course
Bench	A horizontal surface in a sloped deposit.
Caisson	A concrete foundation element cast in a circular excavation which may have an enlarged base. Sometimes referred to as a cast-in-place pier
Concrete Slabs-On-Grade	A concrete surface layer cast directly upon a base, subbase or subgrade.
Crushed Rock Base Course	A base course composed of crushed rock of a specified gradation
Differential Settlement	Unequal settlement between or within foundation elements of a structure.
Engineered Fill	Specified material placed and compacted to specified density and/or moisture conditions under observations of a representative of a soil engineer.
Existing Fill	Materials deposited through the action of man prior to exploration of the site
Existing Grade	The ground surface at the time of field exploration
Expansive Potential	The potential of a soil to expand (increase in volume) due to absorption of moisture
Fill	Materials deposited by the actions of man
Finished Grade	The final grade created as a part of the project.
Gravel Base Course	A base course composed of naturally occurring gravel with a specified gradation.
Heave	Upward movement
Native Grade	The naturally occurring ground surface.
Native Soil	Naturally occurring on-site soil
Rock	A natural aggregate of mineral grains connected by strong and permanent cohesive forces Usually requires drilling, wedging, blasting or other methods of extraordinary force for excavation
Sand and Gravel Base	A base course of sand and gravel of a specified gradation
Sand Base Course	A base course composed primarily of sand of a specified gradation.
Scarify	To mechanically loosen soil or break down existing soil structure.
Settlement	Downward movement
Soil	Any unconsolidated material composed of discrete solid particles, derived from the physical and/or chemical disintegration of vegetable or mineral matter, which can be separated by gentle mechanical means such as agitation in water
Strip	To remove from present location
Subbase	A layer of specified material placed to form a layer between the subgrade and base course.
Subbase Grade	Top of subbase
Subgrade	Prepared native soil surface

GLENDALE MUNICIPAL AIRPORT - BLAST PADS	
Definition of Terminology	
Western Technologies Inc.	
Job No.: 2121JA065	Plate: A-1

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COARSE-GRAINED SOILS

LESS THAN 50% FINES*

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
GW	WELL-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO 4 SIEVE SIZE
GP	POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LESS THAN 5% FINES	
GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, MORE THAN 12% FINES	
GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, MORE THAN 12% FINES	
SW	WELL-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO 4 SIEVE SIZE
SP	POORLY-GRADED SANDS OR GRAVELLY SANDS, LESS THAN 5% FINES	
SM	SILTY SANDS, SAND-SILT MIXTURES, MORE THAN 12% FINES	
SC	CLAYEY SANDS, SAND-CLAY MIXTURES, MORE THAN 12% FINES	

NOTE Coarse-grained soils receive dual symbols if they contain 5% to 12% fines (e g , SW-SM, GP GC)

FINE-GRAINED SOILS

MORE THAN 50% FINES

GROUP SYMBOLS	DESCRIPTION	MAJOR DIVISIONS
ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
OL	ORGANIC SILTS OR ORGANIC SILT-CLAYS OF LOW PLASTICITY	
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS	SILTS AND CLAYS LIQUID LIMIT MORE THAN 50
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY	
PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS	HIGHLY ORGANIC SOILS

NOTE Fine-grained soils may receive dual classification based upon plasticity characteristics

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	Above 12 in
COBBLES	3 in - 12 in
GRAVEL	No 4 - 3 in
Coarse	3/4 in - 3 in
Fine	No 4 - 3/4 in
SAND	No 200 - No 4
Coarse	No 10 - No 4
Medium	No 40 - No 10
Fine	No 200 - No 40
*Fines (Silt or Clay)	Below No 200

NOTE Only sizes smaller than three inches are used to classify soils

CONSISTENCY

CLAYS & SILTS	BLOWS PER FOOT*
VERY SOFT	0 - 2
SOFT	2 - 4
FIRM	4 - 8
STIFF	8 - 16
VERY STIFF	16 - 32
HARD	Over 32

RELATIVE DENSITY

SANDS & GRAVELS	BLOWS PER FOOT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	Over 50

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O D (1 3/8 inch ID) split spoon (ASTM D1586)

PLASTICITY OF FINE GRAINED SOILS

PLASTICITY INDEX	TERM
0	NON-PLASTIC
1 - 7	LOW
8 - 25	MEDIUM
Over 25	HIGH

DEFINITION OF WATER CONTENT

DRY
SLIGHTLY DAMP
DAMP
MOIST
WET
SATURATED

GLENDALE MUNICIPAL AIRPORT - BLAST PADS

Method of Classification

Western Technologies Inc.

Job No 2121JA065 | Plate. A-2

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The number shown in **"BORING NO."** refers to the approximate location of the same number indicated on the "Boring Location Diagram" as positioned in the field by pacing or measurement from property lines and/or existing features, or through the use of Global Positioning System (GPS) devices

"DRILLING TYPE" refers to the exploratory equipment used in the boring wherein **HSA = hollow stem auger**, and the dimension presented is the outside diameter of the HSA used

"N" in "BLOWS/FT " refers to a 2-in. outside diameter split-barrel sampler driven into the ground with a 140 lb. drop-hammer dropped 30 in repeatedly until a penetration of 18 in is achieved or until refusal The number of blows, or "blow count", of the hammer is recorded for each of three 6-in increments totaling 18 in. The number of blows required for advancing the sampler for the last 12 in. (2nd and 3rd increments) is defined as the Standard Penetration Test (SPT) "N"-Value Refusal to penetration is considered more than 50 blows per 6 inch increment (Ref. ASTM D 1586)

"R" in "BLOWS/FT." refers to a 3-in outside diameter ring-lined split spoon sampler driven into the ground with a 140 lb drop-hammer dropped 30 in. repeatedly until a penetration of 12 in is achieved or until refusal. The number of blows required to advance the sampler 12 in. is defined as the "R" blow count. The "R" blow count requires an engineered conversion to an equivalent SPT N-Value Refusal to penetration is considered more than 50 blows per 6 inch increment. (Ref ASTM D 3550).

"SAMPLE TYPE" refers to the form of sample recovery, in which **N = Split-barrel sample, R = Ring-lined sample, G = Grab sample, B = Bucket sample, C = Core sample** (ex diamond bit rock coring).

"DRY DENSITY (LBS/CU FT)" refers to the laboratory-determined dry density in pounds per cubic foot The symbol **"NR"** indicates that no sample was recovered. The symbol **"DU"** indicates that determination of dry density was not possible

"MOISTURE CONTENT (% OF DRY WT.)" refers to the laboratory-determined water content in percent (Ref. ASTM D2216).

"USCS" refers to the "Unified Soil Classification System" Group Symbol for the soil type as defined by ASTM D 2487 and D 2488. The soils were classified visually in the field, and where appropriate, classifications were modified by visual examination of samples in the laboratory and/or by appropriate tests.

These notes and boring logs are intended for use in conjunction with the purposes of our services defined in the text. Boring log data should not be construed as part of the construction plans nor as defining construction conditions.

Boring logs depict our interpretations of subsurface conditions at the locations and on the date(s) noted Variations in subsurface conditions and characteristics may occur between borings. Groundwater levels may fluctuate due to seasonal variations and other factors.

The stratification lines shown on the boring logs represent our interpretation of the approximate boundary between soil or rock types based upon visual field classification at the boring location The transition between materials is approximate and may be more or less gradual than indicated.

GLENDALE MUNICIPAL AIRPORT – BLAST PADS	
Boring Log Notes	
Western Technologies Inc.	
Job No.: 2121JA065	Plate. A-3

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 1

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SM		Silty SAND; trace fine Gravel, dark brown, medium dense, slightly moist.
6 5	124	R		33				
		G						
		G			5			dark gray
					10			Boring Stopped at 10 ft

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES. **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-4

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 2

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC		Clayey SAND, dark brown, medium dense to dense, damp
4 9	124	R		40				
		G						
		G			5			
					10			Boring Stopped at 10 ft

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES **Groundwater Not Encountered**

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-5

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 3

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC		Clayey SAND, fine Gravel, brown, loose to medium dense, slightly moist to moist, light cementation
12 8	111	R		18				
		G						
		G			5			
					10			Boring Stopped at 10 ft.

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-6

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 4

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC		Clayey SAND, some fine to coarse Gravel, light brown, very dense, damp, high cementation
3 4	107	R		50/12"				
		G						
		G			5			
					10			Boring Stopped at 10 ft

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES: **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-7

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 5

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC		Clayey SAND; some fine Gravel, medium brown, loose, slightly moist to moist
11 2	98	R		14				
		G						
					5			Boring Stopped at 5 ft.
					10			

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-8

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 6

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D. Foreman

MOISTURE CONTENT (% OF DRY WT)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC		Clayey SAND, some fine Gravel, brown, medium dense, slightly moist
8 3	110	R		34				
		G						
					5			Boring Stopped at 5 ft
					10			

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-9

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 7

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC		Clayey SAND, with fine to coarse Gravel, very dense, damp, high cementation
4 6		R		50/10"				
		G						
					5			Boring Stopped at 6 ft
					10			

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES: **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-10

BORING LOG

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 8

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D Foreman

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC-SM		Clayey Silty SAND; with fine to coarse Gravel, brown, medium dense, damp
6 5	112	R		29				
		G						
					5			Boring Stopped at 5 ft
					10			

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES: Groundwater Not Encountered

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

BORING LOG

PLATE A-11

DATE DRILLED 6-3-11
LOCATION See Location Diagram
ELEVATION Not Determined

BORING NO. 9

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D. Foreman

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC-SM		Clayey Silty SAND, trace fine Gravel, medium dense, damp
3 9	103	R		26				
		G						
					5			Boring Stopped at 5 ft
					10			

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES Groundwater Not Encountered

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME. DATA PRESENTED IS A SIMPLIFICATION.

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-12

BORING LOG

DATE DRILLED 6-3-11
LOCATION *See Location Diagram*
ELEVATION Not Determined

BORING NO. 10

EQUIPMENT TYPE CME-75
DRILLING TYPE 7"HSA
FIELD ENGINEER D. Foreman

MOISTURE CONTENT (% OF DRY WT.)	DRY DENSITY (LBS/CU FT)	SAMPLE TYPE	SAMPLE	BLOWS/FT	DEPTH (FEET)	USCS	GRAPHIC	SOIL DESCRIPTION
		G				SC-SM		Clayey Silty SAND, some fine Gravel, light brown, medium dense to dense, damp
5 0	104	R		40				
		G						
					5			Boring Stopped at 5 ft.
					10			

N- STANDARD PENETRATION TEST
R- RING SAMPLE
NR- NO SAMPLE RECOVERY
G- GRAB SAMPLE
C- ROCK CORE

NOTES **Groundwater Not Encountered**

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AND AT THE TIME OF LOGGING CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH TIME DATA PRESENTED IS A SIMPLIFICATION

WESTERN TECHNOLOGIES INC.

PROJECT GLENDALE MUNICIPAL AIRPORT - BLAST PADS
PROJECT NO 2121JA065

PLATE A-13

BORING LOG

PHYSICAL PROPERTIES

Boring No	Depth (ft)	Soil Class.	Particle Size Distribution (%) Passing by Weight									Atterberg Limits		Moisture-Density Relationship			CBR (*)	Remarks
			2"	1"	¾"	#4	#10	#30	#40	#50	#200	LL	PI	Dry Density (pcf)	Optimum Moisture (%)	Meth		
1	0 - 5	SM	100	100	96	92	88	71	62	53	31	18	3					2
2	0 - 5	SC	100	100	100	96	93	78	69	61	40	22	9					2
3	0 - 5	SC	100	97	96	87	77	63	59	54	39	38	22					2
4	0 - 5	SC	100	100	100	84	71	54	50	45	31	31	14					2
5	0 - 5	SC	100	100	98	84	73	55	49	44	29	35	14					2
8	0 - 5	SC-SM	100	100	94	87	80	64	53	42	23	23	5					2
10	0 - 5	SC-SM	100	91	90	82	75	60	53	45	26	25	6					2
B1-B2	0 - 5	SC/SM												125 7	10 7	A	6	2,4
B3-B4	0 - 5	SC												124 0	12 3	A	14	2,4
B5-B6-B7	0 - 5	SC												119 6	11 9	A		2,4
B8-B9-B10	0 - 5	SC-SM												125 5	10 3	A		2,4

NOTE NV – no value NP – nonplastic

REMARKS

Classification / Particle Size

1 Visual

2 Laboratory Tested

3 Minus #200 Only

(*) At 95% Compaction ASTM D698

Moisture-Density Relationship

4 Tested ASTM D698/AASHTO T99

5 Tested ASTM D1557/AASHTO T180

GLENDALE MUNICIPAL AIRPORT – BLAST PADS

Physical Properties

Western Technologies Inc.

Job No · 2121JA065 Plate· B-1

CALIFORNIA BEARING RATIO (CBR)

Client C & S COMPANIES
9200 EAST PIMA CENTER PARKWAY, STE 240
SCOTTSDALE, AZ 85258

Date of Report 07-14-11
Job No 2121JA065
Event / Invoice No 2141WP063 Lab No. TB1+TB2
Authorized By L. MCINTOSH Date 05-23-11
Sampled By D. FOREMAN Date 06-03-11
Submitted By D. FOREMAN Date 06-03-11

Project GLENDALE MUNICIPAL AIRPORT - BLAST PADS
Location GLENDALE, AZ
Type / Use of Material BROWN SC/SUBGRADE
Supplier / Source PROJECT SITE/SUBGRADE
Sample Source / Location BORING B1 & B2 COMPOSITE SAMPLE
Source / Location Desig By D FOREMAN Date 06-03-11
Testing Authorized

TEST RESULTS

LABORATORY COMPACTION CHARACTERISTICS ☒ ASTM D698 ☐ AASHTO T99 ☐ ASTM D1557 ☐ AASHTO T180 METHOD A

MAXIMUM DRY DENSITY, PCF	125.7
OPTIMUM MOISTURE, %	10.7

BEARING RATIO OF LABORATORY-COMPACTED SPECIMENS, ASTM D1883

COMPACTIVE EFFORT, BLOWS PER LAYER	10	25	56
DRY DENSITY AT COMPACTION, PCF	116.8	125 1	128.2
PERCENT OF MAXIMUM DRY DENSITY, %	92.9	99 5	102.0
MOISTURE BEFORE COMPACTION, %	10 5	10.4	10.3
MOISTURE AFTER COMPACTION, %	10.4	10.1	10 3
DRY DENSITY AFTER SOAKING, PCF	117.7	125 8	128.6
MOISTURE AFTER SOAKING (TOP ONE INCH), %	13.8	12 1	10.9
MOISTURE AFTER SOAKING (AVERAGE OF TOTAL SAMPLE), %	12 8	10 9	10 6
SWELL, %	0.1	0.0	0 0
CALIFORNIA BEARING RATIO AT 0 100 INCH PENETRATION	5	6	4
CALIFORNIA BEARING RATIO AT 0 200 INCH PENETRATION	5	10	6
SURCHARGE WEIGHT, LBS	20	20	20
PERCENT OF PLUS 19 MM MATERIAL, %	0	0	0

Comments

Copies To CLIENT - (1)

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITION(S) OR SAMPLE(S) TESTED AS STATED HEREIN WESTERN TECHNOLOGIES INC MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS

REVIEWED BY

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CALIFORNIA BEARING RATIO (CBR)

Client C & S COMPANIES
9200 EAST PIMA CENTER PARKWAY, STE 240
SCOTTSDALE, AZ 85258

Date of Report 07-14-11
Job No 2121JA065
Event / Invoice No. 2141WP063 Lab No TB3 + TB4
Authorized By L. MCINTOSH Date 05-23-11
Sampled By D FOREMAN Date 06-03-11
Submitted By D FOREMAN Date 06-03-11

Project GLENDALE MUNICIPAL AIRPORT – BLAST PADS
Location GLENDALE, AZ
Type / Use of Material BROWN SC/SUBGRADE
Supplier / Source PROJECT SITE/SUBGRADE
Sample Source / Location BORING B3 & B4 COMPOSITE SAMPLE
Source / Location Desig By D FOREMAN Date 06-03-11
Testing Authorized

TEST RESULTS

LABORATORY COMPACTION CHARACTERISTICS ☒ ASTM D698 ☐ AASHTO T99 ☐ ASTM D1557 ☐ AASHTO T180 METHOD A

MAXIMUM DRY DENSITY, PCF	124.0
OPTIMUM MOISTURE, %	12.3

BEARING RATIO OF LABORATORY-COMPACTED SPECIMENS, ASTM D1883

COMPACTIVE EFFORT, BLOWS PER LAYER	10	25	56
DRY DENSITY AT COMPACTION, PCF	107.9	117 5	123 5
PERCENT OF MAXIMUM DRY DENSITY, %	87 0	94.7	99.6
MOISTURE BEFORE COMPACTION, %	10.5	10 9	11 0
MOISTURE AFTER COMPACTION, %	11.0	10.7	10.8
DRY DENSITY AFTER SOAKING, PCF	109.0	118 2	124.2
MOISTURE AFTER SOAKING (TOP ONE INCH), %	19 0	15 4	13.3
MOISTURE AFTER SOAKING (AVERAGE OF TOTAL SAMPLE), %	16.5	13.6	12.0
SWELL, %	0 4	0.3	0 4
CALIFORNIA BEARING RATIO AT 0 100 INCH PENETRATION	4	14	26
CALIFORNIA BEARING RATIO AT 0 200 INCH PENETRATION	4	15	30
SURCHARGE WEIGHT, LBS	20	20	20
PERCENT OF PLUS 19 MM MATERIAL, %	0	0	0

Comments

Copies To CLIENT – (1)

THE SERVICES REFERRED TO HEREIN WERE PERFORMED IN ACCORDANCE WITH THE STANDARD OF CARE PRACTICED LOCALLY FOR THE REFERENCED METHOD(S) AND RELATE ONLY TO THE CONDITION(S) OR SAMPLE(S) TESTED AS STATED HEREIN WESTERN TECHNOLOGIES INC MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESSED OR IMPLIED, AND HAS NOT CONFIRMED INFORMATION INCLUDING SOURCE OF MATERIALS SUBMITTED BY OTHERS

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MOTZZ LABORATORY, INC.
2113 S 48th St Suite 109
Tempe, AZ 85282

Soil Analysis Report

Western Technologies
Mike Whitman
3737 E Broadway Road
Phoenix , AZ 85040

Project	2121JA065
Sampler	
Date Received	6/14/2011
Date Reported	6/17/2011
PO Number	2141PO0878

Lab Number: 903605-01 **TB3 (0-5) Event#: 2141WP063**

Sulfate & Chloride	Method	Result	Units	Levels
Sulfate, SO4	ARIZ 733	85	ppm	
Chloride, Cl	ARIZ 736	25	ppm	

Lab Number: 903605-02 **TB1 (0-5) Event#: 2141WP063**

Sulfate & Chloride	Method	Result	Units	Levels
Sulfate, SO4	ARIZ 733	42	ppm	
Chloride, Cl	ARIZ 736	23	ppm	

FLEXIBLE PAVEMENT DESIGN FOR

4/30/2004

Glendale Municipal Airport

AC Method

Glendale, AZ

Engineer - Western Technologies, Inc - AdlR

AIP No 2121JA065

Blast Pad - Runway 1

14.5" **Total Thickness Required (inches)**

No thickness adjustments required

Stabilized Base/Subbase Are Not Required

Initial Pavement Cross Section	
4"	Pavement Surface Layer (P-401)
6" (2.02)	Base Layer (P-209)
4.5"	Subbase #1 (P-154) CBR= 20
0"	Subbase #2 CBR= 0
0"	Subbase #3 CBR= 0

Stabilized or Modified Cross Section		Factors
4"	P-401 Plant Mix Bituminous Pavements	
6"	Not stabilized	1
3"	P-209, Crushed Aggregate Base course	1 5
0"	Material as defined by user	
0"	Material as defined by user	

( ) = Subminimal base thickness calculation

Frost Considerations

0 lb/cf	Dry Unit Weight of Soil	
0	Degree Days °F	
No Data Provide	Frost Penetration Depth	
6	Original CBR value of subgrade Soil	
6	CBR Value used for the Subgrade Soil	Non-Frost Code for Subgrade Soil
20	CBR Value used for subbase #1	Non-Frost code for Subbase #1
0	CBR Value used for subbase #2	Non-Frost code for Subbase #2
0	CBR Value used for subbase #3	No frost selection made for Subbase #3

Design Aircraft Information

The Design Aircraft is a DUAL100 - 100,000 lbs -- ( )

75000 lbs	Gross Weight	20 Design Life (years)
50	Equivalent Annual Departures	

Subgrade Compaction Requirements for Design Aircraft

Non-Cohesive Soils		Cohesive Soils	
Compaction	Depth Required	Compaction	Depth Required
100%	0 - 14 5	95%	0 - 6"
95%	14 5 - 29"	90%	6 - 11"
90%	29 - 40"	85%	11 - 18"
85%	40 - 52 5"	80%	18 - 23 5"

See Appendix 5 to AC 150/5320-6D, Airport Design and Evaluation, for application of this software

FLEXIBLE PAVEMENT DESIGN FOR

4/30/2004

Glendale Municipal Airport
Glendale, AZ

AC Method

Engineer - Western Technologies, Inc - AdlR

AIP No 2121JA065

Blast Pad - Runway 1

12" **Total Thickness Required (inches)**
No thickness adjustments required

Stabilized Base/Subbase Are Not Required

Initial Pavement Cross Section	
4"	Pavement Surface Layer (P-401)
4" (0.62)	Base Layer (P-209)
4"	Subbase #1 (P-154) CBR= 20
0"	Subbase #2 CBR= 0
0"	Subbase #3 CBR= 0

Stabilized or Modified Cross Section		Factors
4"	P-401 Plant Mix Bituminous Pavements	
4"	Not stabilized	1
2.5"	P-209, Crushed Aggregate Base course	1 5
0"	Material as defined by user	
0"	Material as defined by user	

( ) = Subminimal base thickness calculation

Frost Considerations

0 lb/cf	Dry Unit Weight of Soil	
0	Degree Days °F	
No Data Provide	Frost Penetration Depth	
6	Original CBR value of subgrade Soil	
6	CBR Value used for the Subgrade Soil	Non-Frost Code for Subgrade Soil
20	CBR Value used for subbase #1	Non-Frost code for Subbase #1
0	CBR Value used for subbase #2	Non-Frost code for Subbase #2
0	CBR Value used for subbase #3	No frost selection made for Subbase #3

Design Aircraft Information

The Design Aircraft is a SINGLE50 - 45,000 lbs -- ( )

40000 lbs	Gross Weight	20	Design Life (years)
50	Equivalent Annual Departures		

Subgrade Compaction Requirements for Design Aircraft

Non-Cohesive Soils		Cohesive Soils	
Compaction	Depth Required	Compaction	Depth Required
100%	0 - 9	95%	0 - 6"
95%	9 - 21"	90%	6 - 9"
90%	21 - 34"	85%	9 - 14"
85%	34 - 46"	80%	14 - 18 5"

See Appendix 5 to AC 150/5320-6D, Airport Design and Evaluation, for application of this software

FLEXIBLE PAVEMENT DESIGN FOR

4/30/2004

Glendale Municipal Airport

AC Method

Glendale, AZ

Engineer - Western Technologies, Inc - AdIR

AIP No 2121JA065

Blast Pad - Runway 1

6.5" **Total Thickness Required (inches)**

No thickness adjustments required

Stabilized Base/Subbase Are Not Required

Initial Pavement Cross Section	
4"	Pavement Surface Layer (P-401)
4" (0.62)	Base Layer (P-209)
-1.5"	Subbase #1 (P-154) CBR= 20
0"	Subbase #2 CBR= 0
0"	Subbase #3 CBR= 0

Stabilized or Modified Cross Section		Factors
4"	P-401 Plant Mix Bituminous Pavements	
4"	Not stabilized	1
-1"	P-209, Crushed Aggregate Base course	1 5
0"	Material as defined by user	
0"	Material as defined by user	

( ) = Subminimal base thickness calculation

Frost Considerations

0 lb/cf	Dry Unit Weight of Soil	
0	Degree Days °F	
No Data Provide	Frost Penetration Depth	
14	Original CBR value of subgrade Soil	
14	CBR Value used for the Subgrade Soil	Non-Frost Code for Subgrade Soil
20	CBR Value used for subbase #1	Non-Frost code for Subbase #1
0	CBR Value used for subbase #2	Non-Frost code for Subbase #2
0	CBR Value used for subbase #3	No frost selection made for Subbase #3

Design Aircraft Information

The Design Aircraft is a SINGLE50 - 45,000 lbs -- ( )

40000 lbs	Gross Weight	20 Design Life (years)
50	Equivalent Annual Departures	

Subgrade Compaction Requirements for Design Aircraft

Non-Cohesive Soils		Cohesive Soils	
Compaction	Depth Required	Compaction	Depth Required
100%	0 - 9	95%	0 - 6"
95%	9 - 21"	90%	6 - 9"
90%	21 - 34"	85%	9 - 14"
85%	34 - 46"	80%	14 - 18 5"

See Appendix 5 to AC 150/5320-6D, Airport Design and Evaluation, for application of this software

FLEXIBLE PAVEMENT DESIGN FOR

4/30/2004

Glendale Municipal Airport
Glendale, AZ

AC Method

Engineer - Western Technologies, Inc - AdlR

AIP No 2121JA065

Blast Pad - Runway 1

8"	**Total Thickness Required (inches)**
	No thickness adjustments required

Stabilized Base/Subbase Are Not Required

Initial Pavement Cross Section	
4"	Pavement Surface Layer (P-401)
6" (2.02)	Base Layer (P-209)
-2"	Subbase #1 (P-154) CBR= 20
0"	Subbase #2 CBR= 0
0"	Subbase #3 CBR= 0

Stabilized or Modified Cross Section		Factors
4"	P-401 Plant Mix Bituminous Pavements	
6"	Not stabilized	1
-1.5"	P-209, Crushed Aggregate Base course	1 5
0"	Material as defined by user	
0"	Material as defined by user	

( ) = Submiminal base thickness calculation

Frost Considerations

0 lb/cf	Dry Unit Weight of Soil	
0	Degree Days °F	
No Data Provide	Frost Penetration Depth	
14	Original CBR value of subgrade Soil	
14	CBR Value used for the Subgrade Soil	Non-Frost Code for Subgrade Soil
20	CBR Value used for subbase #1	Non-Frost code for Subbase #1
0	CBR Value used for subbase #2	Non-Frost code for Subbase #2
0	CBR Value used for subbase #3	No frost selection made for Subbase #3

Design Aircraft Information

The Design Aircraft is a DUAL100 - 100,000 lbs -- ( )

75000 lbs	Gross Weight	**20**	Design Life (years)
50	Equivalent Annual Departures		

Subgrade Compaction Requirements for Design Aircraft

Non-Cohesive Soils		Cohesive Soils	
Compaction	Depth Required	Compaction	Depth Required
100%	0 - 14 5	95%	0 - 6"
95%	14 5 - 29"	90%	6 - 11"
90%	29 - 40"	85%	11 - 18"
85%	40 - 52 5"	80%	18 - 23 5"

See Appendix 5 to AC 150/5320-6D, Airport Design and Evaluation, for application of this software

Version date 7/02/02

CONSTRUCTION SAFETY and PHASING PLAN

PROJECT 0910005

GLENDALE MUNICIPAL AIRPORT
RUNWAY SAFETY IMPROVEMENTS

AIP No. 3-04-0064-20
ADOT No. E1F27

JUNE 2012

GLENDALE

CITY OF GLENDALE

ENGINEERING DEPARTMENT
5850 W. Glendale Avenue, Glendale, Arizona 85301 (623) 930-3630

Construction Safety and Phasing Plan

Project: **(GEU) Glendale Municipal Airport**
Runway Safety Improvements
FAA AIP No.: **3-04-0064-20**
ADOT No.: **E1F27**
City of Glendale No.: **0910005**

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EXHIBITS:

EXHIBIT NO. 1 – AIRCRAFT OPERATIONS AREA
EXHIBIT NO 2 – AIRCRAFT MOVEMENT AREA
EXHIBIT NO. 3 – RUNWAY/TAXIWAY SAFETY AREAS
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EXHIBIT NO 5 – MARKING PHASING PLAN
EXHIBIT NO 6 – WINDCONE PHASING PLAN
EXHIBIT NO 7 – DUST CAP PHASING PLAN
EXHIBIT NO. 8 – BLAST PAD PHASING PLAN

This manual provides general information to Contractors on the requirements and procedures for accident prevention, safety, and security, at the Glendale Municipal Airport This includes construction, repair, or services required by the Glendale Airport and its tenants. The Airport's safety objective is to achieve accident-free construction projects.

Contractors shall conduct their operations in a manner that will provide safe working conditions for all employees and the protection of the public and all others who may be affected by construction activities. Nothing contained in this manual is intended to relieve any Contractor or supplier of the obligations assumed by the Contractor under contract with the City of Glendale or as required by law.

Safety must be an integral part of each job. Full participation, cooperation, and support are necessary to ensure the safety and health of all persons and property involved in the project.

The purpose of marking, barricading, and lighting airside construction areas is to delineate hazardous areas and prevent unauthorized incursions into the area by personnel, vehicles, equipment, and aircraft during construction

Requirements and procedures in this manual may be altered, on a case-by-case basis, if determined by the Glendale Airport that safety is not compromised and the proposed alternative better meets operational or project needs. Any such alterations or deviations shall be at the sole discretion of the Airport.

The critical operational areas at the Glendale Municipal Airport, hereafter referred to as "the Airport," are defined as follows.

> The Aircraft Operations Area (AOA), for the purpose of this document, is defined as any part of the Airport utilized for aircraft operations and includes any area inside the perimeter fence (Exhibit No. 1).
>
> The Aircraft Movement Area (AMA) is defined as runways, taxiways, and other areas of the Airport that are utilized for taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. The AMA is a restricted area. All vehicle and pedestrian access is prohibited without the approval of the Airport (Exhibit No 2)

The Airport reserves the right to review the Contractor's safety program/record and periodically inspect work sites for compliance with the requirements described in this manual and the contract documents.

1. *COORDINATION*

The Contractor must coordinate with the airport to allow 45-days notification by GEU to FAA of construction activities affecting Part 77 navigable airspace. Filing will be accomplished through FAA form 7460-1.

C&S Engineers, Inc. will submit form 7460-1 to the City of Glendale in conjunction with the Construction Safety Plan.

(a) Contractor Progress Meeting.

- **Pre-Construction Conference.** After completion of the Contract Documents, to include bonds, insurance and signatures, and prior to the commencement of any work on the project, the Engineer will schedule a Pre-Construction Conference. This will be held at the Glendale Municipal Airport, 6801 North Glen Harbor Boulevard., Glendale, Arizona.

  The purpose of this Conference is to establish a working relationship between the Contractor, Utility Companies, and the Engineer. The agenda will include critical elements of the construction schedule, procedures for handling shop drawings and other submittals, cost breakdown of major lump sum items, payment application and processing, coordination with the involved utility companies, emergency telephone numbers for all representatives involved in the course of construction, and establishment of the Notice to Proceed date.

  Minimum attendance by the Contractor shall be a responsible official of the company/corporation, who is authorized to execute and sign documents on behalf of the company/corporation

- **Weekly Meetings.** Progress meetings will be held weekly with the contractor, C&S project manager, project inspector, City of Glendale and airport staff to discuss progress of project, upcoming work, and any issues that need to be resolved.

(b) Scope or Schedule Changes. The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), PERT, or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

The Contractor shall maintain the work schedule and provide an update and analysis of the progress schedule on a twice monthly basis, or as otherwise specified in the contract Submission of the work schedule shall not relieve the Contractor of overall responsibility for scheduling, sequencing, and coordinating all work to comply with the requirements of the contract

2. *PHASING*

The scope of work for this project includes the construction of blast pads on each end of the runway, disassembling and relocating existing blast deflector fencing, and grading and paving the dust cap within the runway safety area, relocating the south windcone outside the Object Free Area, and stripe surface painted location signs at the entrances to the taxiway from the ramp.

Construction activities for this project are currently scheduled to commence summer 2012 and work will be completed within 60 calendar days

(a) Phase Elements.

- **Ramp Marking Phase**

  The ramp surfacing improvements are a Runway Safety Action Team (RSAT) recommendation. This phase consists of the obliteration of existing taxiway centerline marking to the limits of the new surface painted ramp location signs and the painting of new ramp location signs. This work will occur during local closures of ramp connector taxiways The contractor will access this site from the staging area at the south west ramp connector to be named R-1 Not more than two ramp connectors will be closed at one time to allow for adequate aircraft access to Taxiway A. The contractor will coordinate the local closure of ramp connector taxiways with the Airport Manager, including the issuance of NOTAMs and the placement of barricades before work begins in this area This work may be performed with local closures during the day. (Exhibit No 5)

- **Wind Cone Relocation Phase**

  This phase consists of disassembling and relocating the existing secondary wind cone, to include grading in the new wind cone location. A portion of this work is within the runway safety area, which will occur during nighttime closures of Runway 1-19. The contractor will access this site from the staging area by way of the perimeter road The contractor shall use flagmen or escorts to cross the portion of the perimeter road within the Runway Safety Area during periods of work outside the Runway Safety Area for which Runway 1-19 will be open The contractor will coordinate the nighttime closures with the Airport Manager, including the issuance of NOTAMs, the placement of lighted "X"s at ends of Runway 1-19 and the placement of barricades before work begins in this area. (Exhibit No. 6)

- **Blast Deflector Relocation and Dust Cap Construction Phase**

  This phase consists of disassembling and relocating existing blast deflector fencing, and grading and paving the dust cap within the runway safety area. This work will occur during nighttime closures of Runway 1-19. The contractor will access this site from the staging area by way of the perimeter road. The contractor will coordinate the nighttime closures with the Airport Manager, including the issuance of NOTAMs, the placement of lighted "X"s at ends of Runway 1-19 and the placement of barricades before work begins in this area. (Exhibit No 7)

- **Blast Pad Phase**

  This phase consists of the construction of blast pads at each end of Runway 1-19. The contractor will coordinate the nighttime closures with the Airport Manager, including the issuance of NOTAMs, the placement of lighted "X"s at ends of Runway 1-19 and the placement of barricades before work begins in this area. (Exhibit No. 8)

Night time closures will be between 8:30 PM and 5:30 AM

(b) Construction Safety Drawings. Refer to the Phasing Plan exhibits in the Appendix of this safety plan for more detail on the individual phases.

3. *AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY*

The Contractor shall obtain approval from the Engineer prior to beginning any work in all areas of the airport. No operating runway, taxiway, or Air Operations Area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his/her work in such a manner as to insure safety and a minimum of hindrance to flight operations. All Contractor equipment and material stockpiles shall be stored a minimum of 400 feet from the centerline of an active runway. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within 250 feet of an active runway at any time.

(a) Identification of Affected Areas. Refer to the Phasing Plan exhibits (Exhibits 5 through 8) in the Appendix of this safety plan for more detail on the individual phases which identify all affected areas during construction

4. *PROTECTION OF NAVIGATION AIDS (NAVAIDS)*

Construction activity in the vicinity of navigational aids requires special consideration. The effect of the activity and its permissible distance and direction from the aid must be evaluated in each instance. A coordinated evaluation by the Airport and the FAA is necessary. Technical involvement by FAA Airports, Air Traffic, and Airway Facilities specialists is needed as well as construction, engineering and management input. Stockpiling materials and movement and parking of equipment that may interfere with electronic signals is prohibited.

Coordinate all NAVAID facilities that will be affected and/or need to be placed out of service at any time prior to or during this project with the Airport Manager

5. *CONTRACTOR ACCESS*

Refer to Exhibit No's. 5 through 8 for the exact locations of the contractor staging areas and site access routes.

(a) Location of Stockpiled Construction Materials. All Contractor equipment and material stockpiles shall be stored a minimum of 400 feet from the centerline of an active runway No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within 250 feet of an active runway at any time.

The Contractor may place or stockpile materials in the public right-of-way, if approved by the Engineer, provided they do not prevent access to adjacent properties or prevent compliance with traffic regulations.

Traffic shall not be required to travel over stockpiled materials, and proper dust control shall be maintained.

The equipment staging area cannot be located in high traffic areas within the AOA. Any staging areas used must be left environmentally clean during and at completion of the construction project This includes keeping the area clean of debris, oil spills, and other undesirable elements. Any hazardous or regulated waste material produced by the Contractor must be properly disposed of at the Contractor's expense according to all local, state, and federal regulations. The Contractor may be required to provide test results to confirm an area has been left environmentally clean with any contamination removed.

(b) Vehicle and Pedestrian Operations. The Contractor's attention is directed to FAA Advisory Circular 150/5210-5D "Painting, Marking, and Lighting of Vehicles Used on Airports" All contract vehicles and equipment shall be provided with 3' x 3' orange and white checkered flags or flashing amber lights as described in Paragraph 7.c. All vehicles must have the company name legibly visible on each side of the vehicle, in a minimum 4-inch high lettering painted in contracting colors, or magnetic placecards meeting the standard.

The Contractor will contact the Airport Operations Department five (5) calendar days before the start of construction to submit the necessary airport security information for all vehicles and personnel which will be required inside the airport security fence during construction.

Special security precautions are required and identification of all vehicles and personnel entering onto the airfield will be necessary. Equipment and workmen will be restricted to the work area defined on the attached Exhibits 5 through 8 for each phase of this project. Any violation of Contractor's personnel, equipment, or vehicles will subject the Contractor to penalties imposed by the FAA Airport Operations Department. The Contractor shall maintain the security integrity between the public and Air Operations Area.

The Contractor shall be responsible for controlling his employee's vehicles and equipment movements on the airport operating areas. Specifically, the Contractor shall escort his employees across any adjacent runways and/or taxiways.

Escorts shall monitor CTAF 121.0 and not cross any vehicle/equipment or pedestrian traffic on an active runway if there is any aircraft traffic on final approach or takeoff for that runway or a taxiway if an aircraft is within 1,000 feet of the crossing point.

All vehicles shall be operated in strict compliance with all posted speed limits at the Airport. The maximum speed limit for all vehicles in the airside, with the exception of authorized municipal and emergency services vehicles in the performance their official duties, is fifteen (15) miles per hour, or less, if conditions warrant to ensure safe operation.

6. WILDLIFE MANAGEMENT

The Contractor shall comply with all Federal, state, and local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

This project does not include wildlife management.

7. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT

The Contractor shall take whatever steps, procedures or means required to preventing abnormal dust conditions due to his construction operations in connection with this contract. The dust control measures shall be maintained at all times during construction of the project, to the satisfaction of the Engineer, in accordance with the requirements of the "Maricopa County Health Department Air Pollution Control Regulations" which have been adopted pursuant to A.R.S. § 36-779.

The Contractor shall be required to obtain the necessary permit from the Maricopa County Air Pollution Control Bureau, 1001 N. Central Ave., Phoenix, Arizona 85004 - telephone (602) 506-6727.

Contractor is working in an air operations area in which a high degree of care is necessary to control debris and dust. Spilled material on active roadways, taxiways, runways, and aprons shall be swept up within an immediate time frame. Contractor shall be aware that the construction area is subject to jet blast which is equivalent to wind velocities of 75 to 90 miles per hour Constant dust control measures will be required to prevent loose material from blowing across the airfield.

8. *HAZARDOUS MATERIALS (HAZMAT) MANAGEMENT*

Contractor is responsible for the appropriate handling, disposal of, and if necessary, any remediation and all losses and damages to the City, associated with the use or release of hazardous substances by Contractor in connection with completion of the Project.

9. *NOTIFICATION OF CONSTRUCTION ACTIVITIES*

All communication should involve the Airport Manager as the main point of contact.

INFORMATION, COMPLIANCE, AND ASSISTANCE

AIRPORT MANAGER

(623) 930-2188

The Glendale Municipal Airport is a towered airport with a CTAF frequency of 121.0. The Contractor shall have VHF radios and monitor the air traffic control frequency throughout the project.

(a) Notices to Airman (NOTAM). The Contractor shall notify the Airport Manager at least 72 hours in advance of work that will require the issuance of a NOTAM. The airport will then issue the NOTAM's accordingly.

(b) Emergency Notification Procedures. In the event of an emergency at the Airport, the Airport Manager shall have absolute control of the Airport during such emergency. In the event that the Airport Manager believes conditions of the Airport are unsafe for aircraft operations, it shall be within the Airport Manager's authority to close the entire Airport or any part of the Airport.

EMERGENCY TELEPHONE NUMBER

9-1-1

FOR

√POLICE √FIRE √RESCUE

(d) Coordination with ARFF Personnel. There are no ARFF facilities on site at this airport.

(e) Notification to the FAA. The Engineer and the City shall coordinate directly with the FAA.

10. INSPECTION REQUIREMENTS

(a) Daily (or more frequent) Inspections. Inspectors employed by the Owner shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor

Inspectors employed by the Owner are authorized to notify the Contractor or his/her representatives of any failure of the work or materials to conform to the requirements of the contract, plans, or specifications and to reject such nonconforming materials in question until such issues can be referred to the Engineer for his/her decision.

All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

If the Engineer requests it, the Contractor, at any time before acceptance of the work, shall remove or uncover such portions of the finished work as may be directed After examination, the Contractor shall restore said portions of the work to the standard required by the specifications. Should the work thus exposed or examined prove acceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be paid for as extra work; but should the work so exposed or examined prove unacceptable, the uncovering, or removing, and the replacing of the covering or making good of the parts removed will be at the Contractor's expense

Any work done or materials used without supervision or inspection by an authorized representative of the Owner may be ordered removed and replaced at the Contractor's expense unless the Owner's representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

Should the contract work include relocation, adjustment, or any other modification to existing facilities, not the property of the (contract) Owner, authorized representatives of the owners of such facilities shall have the right to inspect such work. Such inspection shall in no sense make any facility owner a party to the contract, and shall in no way interfere with the rights of the parties to this contract.

(b) Final Inspections. Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be completed in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The Engineer shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

If, however, the inspection discloses any work, in whole or in part, as being unsatisfactory, the Engineer will give the Contractor the necessary instructions for correction of same and the Contractor shall immediately comply with and execute such instructions. Upon correction of the work, another inspection will be made which shall constitute the final inspection, provided the work has been satisfactorily completed In such event, the Engineer will make the final

acceptance and notify the Contractor in writing of this acceptance as of the date of final inspection

11. UNDERGROUND UTILITIES

The Contractor will be required to protect all existing pavement, paintstriping, lights, navaids, drainage structures and other facilities on the airport that are not specifically called for removal as part of this project. Any damage done by the Contractor or through his operations shall be repaired at the Contractor's expense to the satisfaction of the Engineer and the City.

- **Existing Utilities:** The Contractor is hereby advised that the location of all utilities, as shown on the plans, may not be complete nor exact and the Contractor shall satisfy himself as to the exact location of the utilities by contacting Blue Stake or the utility companies before proceeding with the work. After the underground utilities are located by Blue Stake or the utility company, the contractor shall excavate in a careful and prudent manner to prevent unwillful damage to the underground utilities.

  In the event the Contractor or its Subcontractor damages an existing, properly identified underground City of Glendale water or sewer line, the Contractor shall be responsible for the repairs at its expense.

  The exact location of all existing underground service utilities, whether or not indicated on the plans, shall be determined by the Contractor at no expense to the City, and he shall conduct his work so as to prevent interruption of service or damage to them.

  The Contractor shall protect existing utility services and be responsible for their replacement if damaged by him, or to make necessary adjustment in their location, if required, in order to complete the work for his Contract.

  Utility companies and other interested parties have been provided with construction plans and the construction schedule for this project The Contractor shall comply with MAG Specifications 105.6 to cooperate with the utility companies.

- **Maintenance of Irrigation Facilities:** Where irrigation facilities interfere with construction, the Contractor shall remove and replace the affected irrigation facilities to its original condition Final acceptance of replaced facilities will depend upon final approval of the Engineer

- **Overhead Utility Lines and Poles:** Contractor is advised that when work around overhead lines and poles is required on a project the Contractor is required to coordinate with Utility Companies who own and operate overhead lines and poles. The coordination may include, but not be limited to the following activities: pole bracing, de-energizing of lines, and temporary relocations. Contractor is responsible to contact the applicable Utility Company representative and discuss his proposed construction methods, in order to determine what actions the Utility Company must take and the costs related to those actions The Contractor shall include these costs in the applicable bid items for this project.

The primary and the backup representatives for this review and cost determinations are as follows:

Arizona Public Service:	Mr. Bobby Garza	602-371-7989
CenturyLink	Mr. Ron Floyd	602-630-1932
Salt River Power:	Mr. Al Baizel	602-236-0840
Cox Communications·	Mr. Randy Sims	623-694-9593
Cox Communications:	Ms. Suzanne Holzer	623-328-3522

- **Southwest Gas Facilities Exposed During Construction:** The Contractor, upon exposing a gas line during construction, shall call SOUTHWEST GAS at 602-271-4277. The Southwest Gas patrolman will respond, usually within an hour, to inspect the line. Minor cuts or abrasions to the pipe coating will be rewrapped and tracer wire will be reconnected at no cost to the City.
- **Underground Utilities Bedding:** All water, sewer, storm drain, irrigation and other conduits installed within the City of Glendale shall be bedded from bottom of excavation to one foot above the pipe with granular bedding material meeting the requirements of Section 601.4.6 of MAG Uniform Standard Specifications. The initial bedding under the pipe is required for pipe having an inside diameter of 12 inches or larger, and in all cases where rock larger than 1-1/2" is encountered in the trench bottom.
- **Sewer Service Lines:** The Contractor shall be responsible for locating, and protecting from damage during construction, all sewer service lines within the project which are not owned by the City.

  Contractor will be permitted to review the "as-builts" to assist Contractor in locating the non-City owned sewer service lines. These "as-builts" were prepared, and supplied to the City, by private developers or contractors who installed the non-City owned sewer service lines. Therefore, the City does not guarantee or warranty the accuracy of such "as-builts" and the contractor, as a condition for being allowed to review such "as-builts", hereby agrees to hold the City harmless for any and all damages or other expenses contractor may incur as a result of any inaccuracies or incorrect information in these "as-builts".

12. PENALTIES

Due to the safety and security precautions necessary at Glendale Municipal Airport, failure of the Contractor to adhere to the prescribed requirements has consequences that may jeopardize the health, welfare and lives of persons using this Airport. Therefore, if the Contractor is found to be in non-compliance to the security, airfield safety and badging requirements, the Airport Operations Department may issue fines if the situation is severe enough that a verbal or written reprimand will not suffice. Appeals to the fines can be made within four days of the incident by writing to the Airport Manager. The appeal must state why the fine/circumstances are unwarranted. A final decision will then be made

Fine Schedule:

1. Active Runway Intrusion $15,000.00
2. Active Taxiway Intrusion $10,000.00
3. Taxiway Safety Area $1,000.00
4. Security Non-Compliance

   First Offense $1,000.00

   Second Offense $5,000.00

   Third Offense $15,000.00
5. Security/Driver's Permit Non-Compliance - Fine Schedule Same as 3.
6. The Airport Department has the option to issue warnings on first offense, based upon the circumstances of the incident.
7. Individuals involved in a non-compliance violation may be required to surrender their security/driver's badge pending investigation and resolution of the matter.
8. The Contractor will assume all fines against the airport assessed to them by the FAA for the Contractor's violations. Typical FAA fines are $10,000 or more per incident.

13. SPECIAL CONDITIONS

- The Glendale Municipal Airport is a towered airport with a CTAF frequency of 121.0. The Contractor shall have VHF radios and monitor the air traffic control frequency throughout the project.
- Construction activity shall be prohibited when equipment penetrates the imaginary surface described in Title 14 CFR Part 77 and any restricted area as defined in AC 150/5300-13, "Airport Design" current edition, unless a favorable airspace finding has been made by the FAA and the airport, and approved by the Airport Manager. Equipment that penetrates the Part 77 imaginary surface must display a checkered flag during daytime use and a red obstruction light during nighttime use.
- All construction personnel that are working on the AOA during hours of darkness shall wear clothing with reflective markings.

14. RUNWAY AND TAXIWAY VISUAL AIDS.

(a) General. When areas on the Airport are closed or present hazards due to construction activities, they should be marked and lighted according to AC 150/5340-1F "Standards for Airport Markings", current edition. Marking and lighting must be approved by the Airport Manager.

When the work requires closing an air operations area of the airport or portion of such area, the Contractor shall furnish, erect, and maintain temporary markings and associated lighting conforming to the requirements of AC 150/5340-1K, Standards for Airport Markings

(b) Markings. All existing pavement markings requiring removal shall be obliterated by either sandblasting, black paint or slurry seal at the direction of the Airport Manager and/or Construction Observer.

Temporary markings consist of paint or temporary preformed marking tape (removable).

All permanent pavement markings shall be restored at project completion

(c) Lighting and Visual NAVAIDS.

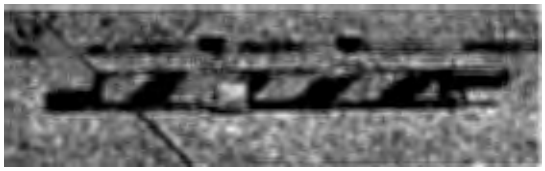
- Airside construction sites shall be barricaded and lighted to delineate the work area. Extended projects on paved surfaces delineating hazardous areas which an aircraft may not enter shall be defined by barricades with ommidirectional red flashing beacons and/or flags (Exhibit No 4).
- Construction areas closed less than 10 hours on taxiways, runways or ramps shall be defined by the placement of barricades with red flashing beacons and shall be secured in place with two sandbags Red flashing beacons are not required on barricades during daylight hours and good visibility Barricades shall be placed 10 feet apart beginning with a barricade placed on the centerline of taxiway, runway or ramp areas. The Contractor shall have a person on call 24 hours a day to maintain all barricades including lights and flags used to delineate construction and hazardous areas in fully operational condition.
- Construction projects over 10 hours on non-paved areas in active taxiway and runway object free areas (Runway Object Free area, group II, 400' from centerline; Taxiway Object Free area, group II, 66' from centerline) shall be barricaded with rubber based upright delineators placed 10' apart with alternating orange and white flag lines between delineators along the construction boundary facing the taxiway or runway. Remaining construction boundary lines shall be barricaded to adequately delineate any hazardous areas.
- For projects under 10 hours in active taxiway and runway object free areas, at the discretion of Airport Operations and Engineering personnel, boundaries may be delineated with spray paint and/or wooden laths placed 10' apart. Open trenches and excavations in taxiway and runway object free areas must be marked and lighted with red lights during hours of restricted visibility or darkness.
- The perimeters of the actual work areas shall be adequately barricaded and lighted with red obstruction clearance lights, to prevent intrusion by taxiing aircraft and vehicles. Barricade lights shall be supplemented by 2-20" x 20" orange flags at each light, installed so they are always in the extended position and properly oriented. Flag mounting brackets must be capable of securely holding the flags in position against the effects of wind and jet blast. The Contractor is required to prepare a barricade plan and to submit it to the Engineer for approval at least five (5) working days prior to commencing work at the site. Written approval of the Contractor's barricade plan is required prior to commencing work.
- When construction involves an extended closure of a runway, an illuminated cross ("X") shall be required at each end and shall be serviced and maintained by the Contractor. The lighted crosses ("X") shall be provided by the Airport.
- Construction projects on airside may involve overlays and/or milling operations on runway or taxiway surfaces. This operation will require the construction of temporary ramps to allow runway or taxiway use between actual work shifts during the airside non-peak hours.

- The contractor shall request closure of runways and/or taxiways, but the Airport Manager retains all rights to close runways and/or taxiways at the Glendale Municipal Airport/
- The contractor shall be responsible for maintaining runway closure markers, when in use.
- All temporary markings and traffic control for runway and taxiway closures shall be in conformance with the requirements of the FAA Advisory Circular 150/5370-2F.
- Temporary light plants used in conjunction with nighttime work cannot be located in such a manner as to be an obstruction or hazard. In addition, these light plants cannot be located where the glare of the light will cause visual or physical interference to operating aircraft.
- Damage to existing edge lights, guidance signs and navaids is the sole responsibility of the Contractor. The damaged items shall be repaired or replaced at no additional cost to the City.
- The Contractor shall provide red obstruction lights for all stationary cranes erected on the construction site. All moveable cranes shall be equipped with red obstruction lights if the boom cannot be lowered during hours of darkness. The Airport Manager will issue NOTAMs on obstructions; lighting; the Contractor shall notify the Engineer if any relocation takes place.

Approved Types of Barricades

- ***Low level water filled*** barricades will have the following lighting
  - When delineating a taxiway edge adjacent to construction each barricades should be configured with one steady blue and one flashing red light
  - When delineating a closed area or identifying a construction hazard each barricade should be configured with at lease one flashing red light
- ***Vertical Panel*** type barricades with heavy rubber base and one flashing red light will be used to delineate OFA's within or adjacent to construction areas

Note *Only barricades located outside of the OFA may be supplemented with sandbags for added support.*



(d) Signs. All permanent signs affected by construction shall be replaced by temporary signs acceptable to the Airport Manager. The Contractor shall submit a sign relocation plan to the Airport Manager for approval prior to any relocation of any existing signs. When construction takes place near the AMA and at the discretion of Airport Operations and Engineering personnel, signs stating **"ACTIVE RUNWAY/TAXIWAY DO NOT ENTER"** shall be required.

15. MARKING AND SIGNS FOR ACCESS ROUTES

The contractor shall install and maintain barricades to delineate haul routes from the specified access gate across or along any apron area.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).

Visible setback lines will be established prior to construction activity taking place adjacent to active taxiways and aprons. All vehicles, equipment, and construction activity must stay behind these lines unless provisions are made with Airport and Engineering personnel. Locations where setback lines will be placed is determined by the Airport's design aircraft (C II) and setback lines will be located at 45 feet from the taxiway or apron taxilane centerline.

At the discretion of Airport Manager and Engineering personnel, setback lines will be delineated according to the scope and timeframe of each project. Short-term projects (less than 10 hours duration) involving limited personnel may be delineated with spray paint and/or wooden laths placed 20 feet apart. For projects involving numerous personnel and subcontractors, setback lines will be delineated with rubber-based upright delineators with alternating orange and white flag lines between delineators. Contractors will maintain setback lines in a clearly visible condition until project completion. If approved by the Airport Manager, construction may be permitted within the setback lines if the following provisions are met:

- A designated observer/spotter (other than the equipment operator) is on the site to direct the operator and equipment to yield to oncoming aircraft. The observer/spotter must be able to immediately get the attention of the operator and direct equipment beyond the setback lines. Equipment must be in position to immediately respond.

It is determined by Airport Manager and Engineering personnel that the height of the equipment and materials is safely below any part of the aircraft using the AOA that might overhang those areas.

If the above-stated provisions cannot be met, construction activity will not be allowed until a taxiway/apron closure can be scheduled with Airport Manager and Construction Observer.

The Contractor shall post a trained guard at any gate used for access to the Airport, and monitor traffic in and out of the gate. All gates that are not attended by a guard shall be closed and locked. Manned gates shall have a lifting gate to cover the width of the opening that is operated by the guard.

Refer to Exhibit No's. 5 through 8 for the exact location of the contractor staging area and site access route.

16. HAZARD MARKING AND LIGHTING

The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated. Unless otherwise specified, barricades, warning signs, and markings for hazards that are in the air operations area shall be a maximum of 18 inches high. Unless otherwise specified, barricades shall be spaced not more than 25 feet apart.

For vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in reasonable conformity with the Manual of Uniform Traffic Control Devices for Streets and Highways (published by the United States Government Printing Office).

When the work requires closing an air operations area of the airport or portion of such area, the Contractor shall furnish, erect, and maintain temporary markings and associated lighting conforming to the requirements of AC 150/5340-1K, Standards for Airport Markings.

The Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stock piles, and his/her parked construction equipment that may be hazardous to the operation of emergency fire-rescue or maintenance vehicles on the airport in reasonable conformance to AC 150/5370-2F, Operational Safety on Airports During Construction.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work that requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their dismantling is directed by the Engineer.

Open-flame type lights shall not be permitted within the air operations areas of the airport

17. PROTECTION

Runways and taxiways have safety areas as shown on Exhibit No. 3. These safety area dimensions will be based on the type of aircraft using the runway and taxiway during construction activities.

The runway and taxiway safety areas shall be·

- Cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations.
- Drained by grading or storm sewers to prevent water accumulation.
- Capable under dry conditions of supporting construction and maintenance equipment, aircraft rescue, fire-fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.
- Free of objects, except for objects that need to be located in the runway safety area because of their functions. These objects shall be constructed on low impact resistant supports (frangible mounted structures) to the lowest practical height with the frangible point no higher than 3 inches above finished grade. Other objects, such as manholes, shall be constructed at grade. In no case shall their height exceed 3 inches above grade.

All work on this project is within the limits of Glendale Municipal Airport operational area, and as such, strict safety and security requirements are in effect. The Contractor's attention is directed to FAA Advisory Circular 150/5370-2F "Operational Safety On Airports During Construction", and FAA Advisory Circular 150/5210-5D "Painting, Marking, and Lighting of Vehicles Used on Airports". All contract vehicles and equipment shall be provided with 3' x 3' orange and white checkered flags or flashing amber lights as described in Paragraph 7 c. All vehicles must have the company name legibly visible on each side of the vehicle, in a minimum 4-inch high lettering painted in contracting colors, or magnetic placecards meeting the standard. The Contractor's attention is directed to FAA Advisory Circular 150/5340-1K "Standards for Airport Markings", the requirements of Paragraphs 39 and 41 regarding marking closed or hazardous areas shall be adhered to.

When aircraft operations are being conducted on a runway or taxiway, construction activity is prohibited within any of the above listed areas, as defined in the Federal Aviation Administration's (FAA) Advisory Circular (AC) 150/5300-13, "Airport Design" current edition, unless approved on a case-by-case basis by the Airport Manager, where construction equipment and material is properly marked and lighted.

Open trenches exceeding 3 inches in depth and 5 inches in width or stockpiled material are not permitted within the limits of safety areas of operational runways. Coverings for open trenches or excavations shall be of sufficient strength to support the weight of the heaviest aircraft operating on the runway or taxiway Contractors must prominently mark open trenches and excavations at the construction site, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(a) Runway Safety Area (RSA). Runway 01/19 Safety Areas are 200 feet each side of the runway centerline, 1,000 feet off Runway 01 end, and 1,000 feet off Runway 19 end. (Exhibit No. 3)

(b) Runway Object Free Area (ROFA). Runway 01/19 OFA is 800 feet wide, or 400 feet each side of the runway centerline.

(c) Taxiway Safety Area (TSA). Taxiway Safety Areas are 39.5 feet each side of the taxiway centerline. (Exhibit No. 3)

(d) Taxiway Object Free Area (TOFA). A TOFA extends, as a minimum, out to 45 feet from the centerline for group II aircraft.

(e) Obstacle Free Zone (OFZ). Runway 01/19 OFA is 400 feet wide, or 200 feet each side of the runway centerline.

(f) Runway Approach/Departure Surfaces. A runway primary surface extends out to 500 feet from the runway centerline and the transitional surface is a 7:1 slope up to 150 feet. Any equipment in these areas must be approved by the Airport Manager.

When working near a runway or taxiway ask the Airport Manager for assistance in defining these areas before work begins

18. OTHER LIMITATIONS ON CONSTRUCTION

The Contractor must coordinate with the airport to allow 45-days notification by GEU to FAA of construction activities affecting Part 77 navigable airspace. Filing will be accomplished through FAA form 7460-1.

- C&S Engineers, Inc. will submit form 7460-1 to the City of Glendale in conjunction with the Construction Safety Plan.

If runway and taxiway closures are necessary, construction may be limited to nighttime, requiring 24-hour prior coordination. Anything that impacts aircraft operations shall be coordinated with the Airport Manager through the appropriate Project Engineer.

Open-flame welding or torch-cutting operations are prohibited unless adequate fire and safety precautions are provided.

Stockpiled material should be constrained in a manner to prevent movement resulting from aircraft blast or wind conditions. Material will not be stored near areas susceptible to jet blast.

GLOSSARY

Advisory Circular (AC):

Documents produced by the FAA providing guidelines for airport facilities. Advisory Circular(s) are available at Internet address: https://www.faa.gov/regulations_policies/advisory_circulars/

Air Traffic Control Tower (ATCT, Control Tower, or Tower):

Controls, by radio communications, all aircraft and vehicular movement on the aircraft movement area.

Aircraft Movement Area (AMA):

The taxiways and runways controlled by the FAA ATCT. Movement area boundary lines define these areas. (Exhibit No 2)

Aircraft Operations Area (AOA):

The AMA expanded to include ramps/aprons and all areas inside the Airport perimeter fence. (Exhibit No 1)

Apron:

The area near the buildings where aircraft load/unload and are serviced–also referred to as the ramp.

Contractor:

The entity responsible for the completion of a contract or portion of a contract.

Engineer:

The engineering representative designated to represent the Owner for the purpose of providing the Owner's directives relating to this Contract and for all administration and communication required between the Owner and the Contractor on Airport projects

Federal Aviation Administration (FAA):

Federal agency that governs aviation and activities at civilian airports.

Foreign Object Debris (FOD):

Unwanted, dangerous items on the ramps, taxiways, and runways that could damage an aircraft.

Object Free Area (OFA):

An area on the ground centered on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes

Obstacle Free Zone (OFZ):

The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVIDS that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches

Owner:

City of Glendale, Arizona

Primary Surface:

A surface longitudinally centered on a runway extending 200' beyond each end of the runway. The width varies from 250' for utility runways having only visual approaches to 1000' for precision instruments runways.

Transitional Surface:

A surface that extends outward and upward at right angles from the sides of the primary surface and the approach surface at a slope of 7 to 1.

Safety Areas:

Runway: Runway 01/19 Safety Areas are 200 feet each side of the runway centerline, 1,000 feet off Runway 01 end, and 1,000 feet off Runway 19 end. (Exhibit No. 3)

Taxiway: Taxiway Safety Areas are 39.5 feet each side of the taxiway centerline. (Exhibit No. 3)

Secure Area:

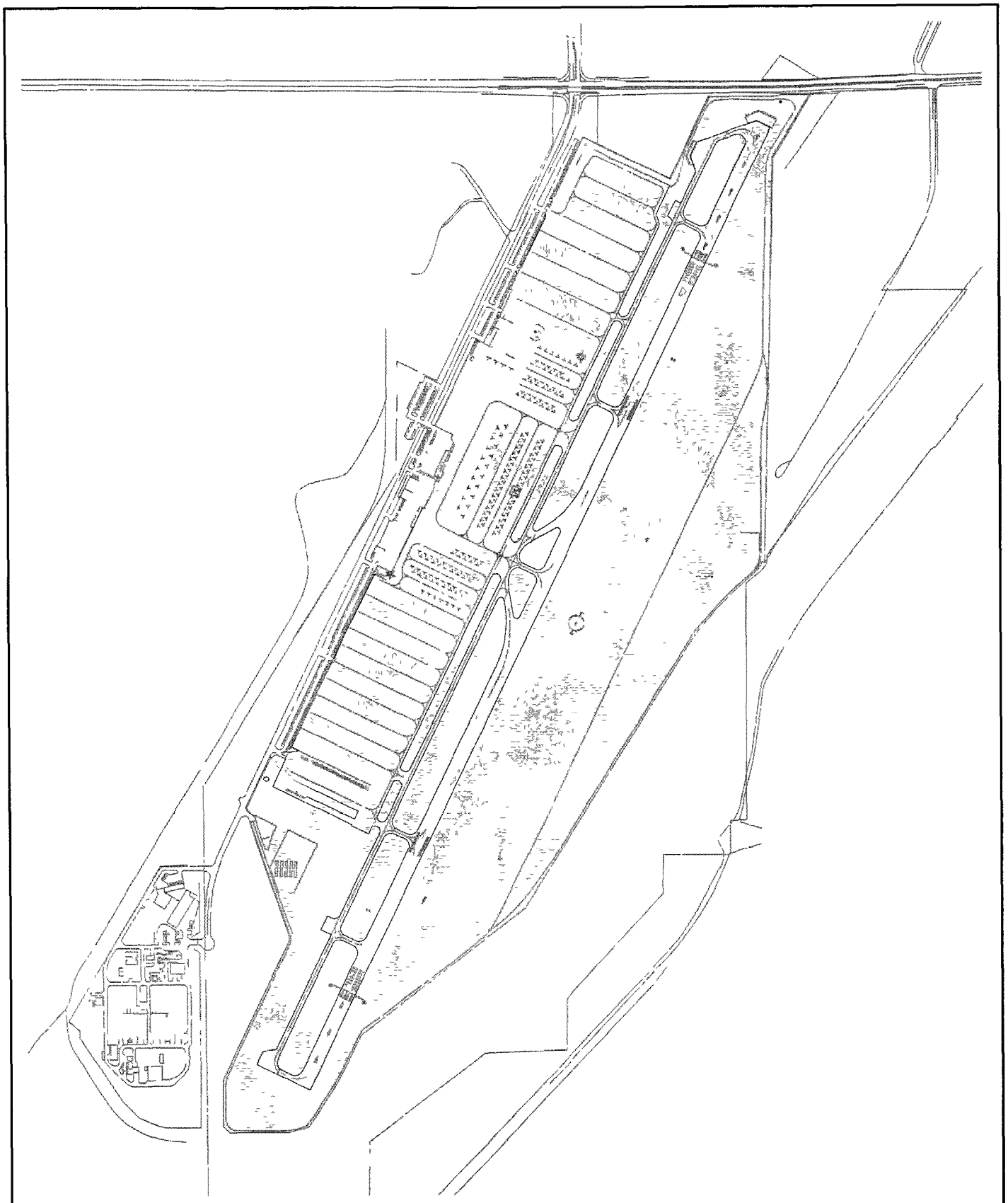
This area of the Airport refers to the acreage around the runways, protected by the secure exits from buildings, secure gates, and chain-link fences or any other area identified by Airport Manager as secure or restricted.

Glendale Municipal Airport (GEU):

Located on approximately 427 acres in the western portion of the City of Glendale and has one 7150 ft x 100 ft Runway (Runway 01/19)

City of Glendale:

The governing body responsible for Glendale Municipal Airport.



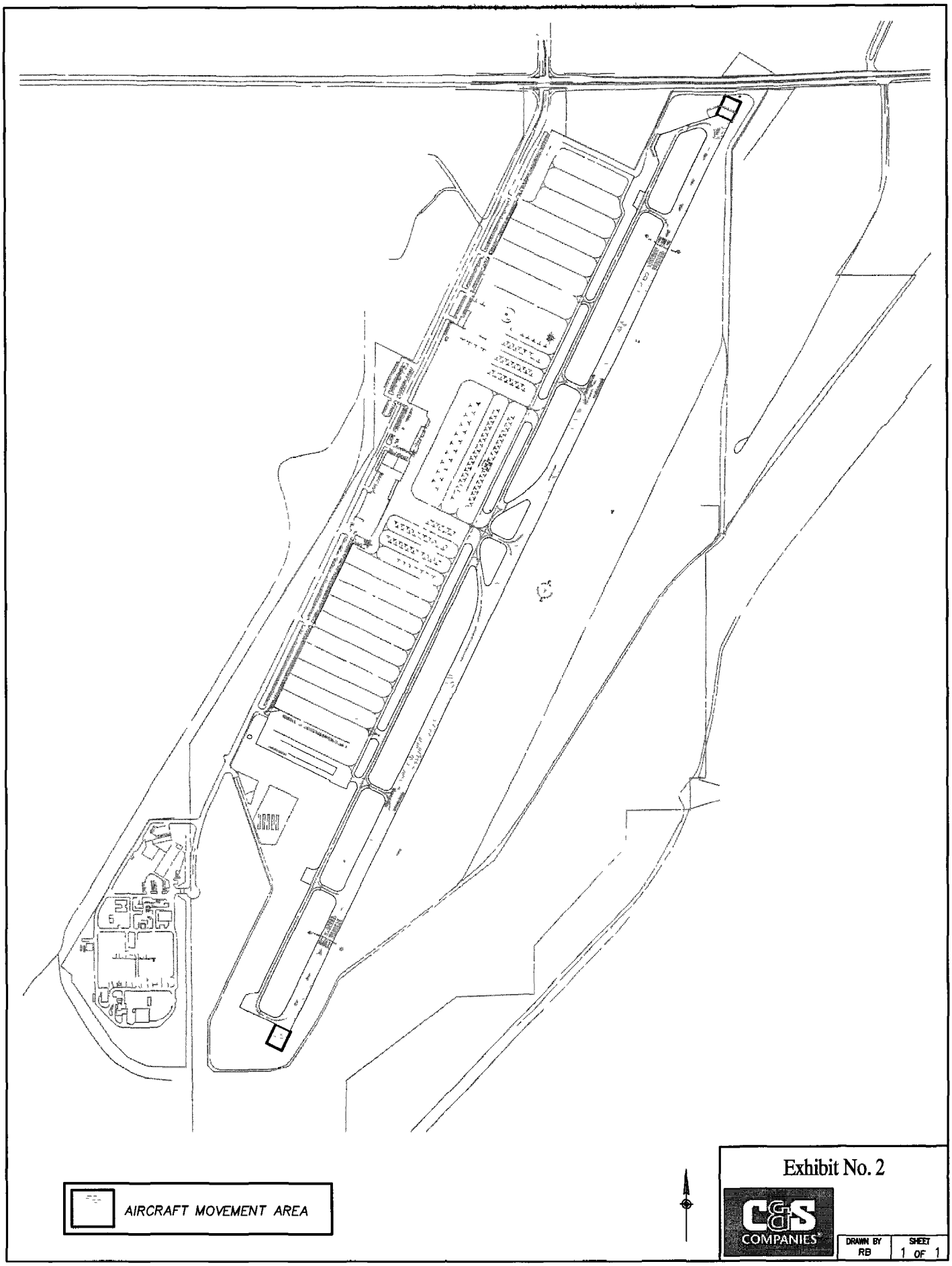
AIRCRAFT OPERATIONS AREA

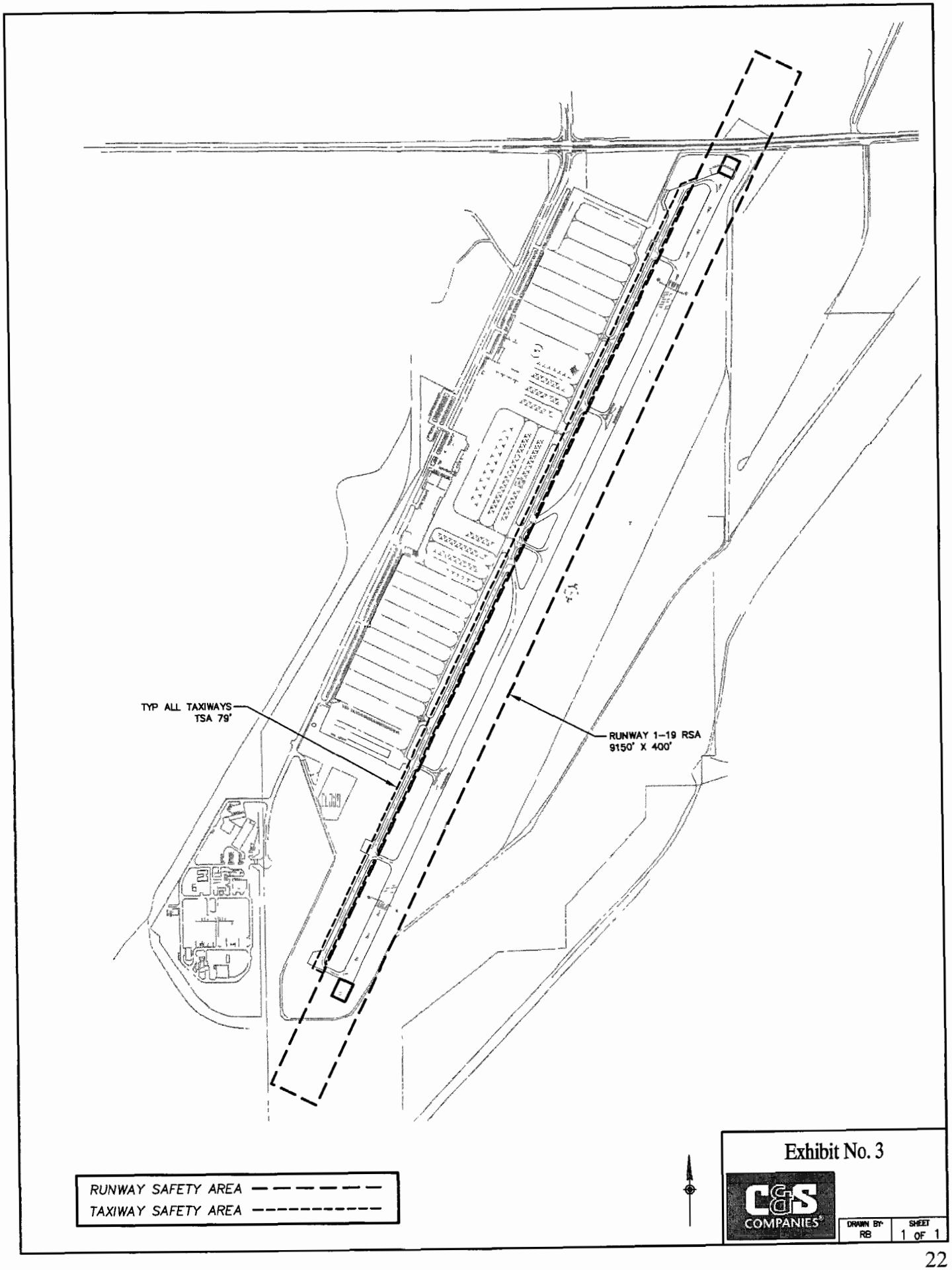
Exhibit No. 1

C&S COMPANIES®

DRAWN BY	SHEET
RB	1 OF 1

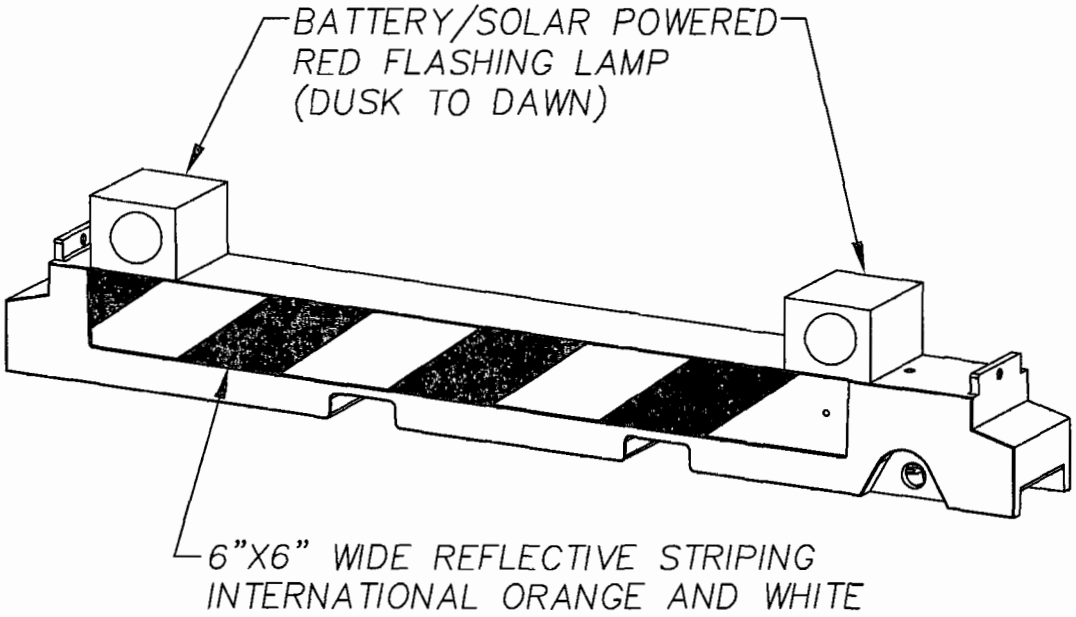
January 30, 2012


AIRCRAFT MOVEMENT AREA
Exhibit No. 2
C&S COMPANIES
DRAWN BY RB
SHEET 1 OF 1


TYP ALL TAXIWAYS
TSA 79'
RUNWAY 1-19 RSA
9150' X 400'
RUNWAY SAFETY AREA
TAXIWAY SAFETY AREA
Exhibit No. 3
C&S COMPANIES
DRAWN BY: RB
SHEET 1 OF 1

LOW PROFILE SAFETY BARRICADE

NTS



BARRICADE NOTES:

1. MAXIMUM SPACING BETWEEN BARRICADES SHALL BE 10 FEET. BARRICADES SHALL BE SET BACK 2 FEET FROM THE LIMITS OF CONSTRUCTION.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING PROPER POSITIONING OF ALL BARRICADES.
3. WATER-FILLED TYPE BARRICADES SHALL BE USED (SEE SPECIFICATIONS)
4. BARRICADES SHALL HAVE TWO FLASHING LAMPS.

Exhibit No. 4

C&S COMPANIES

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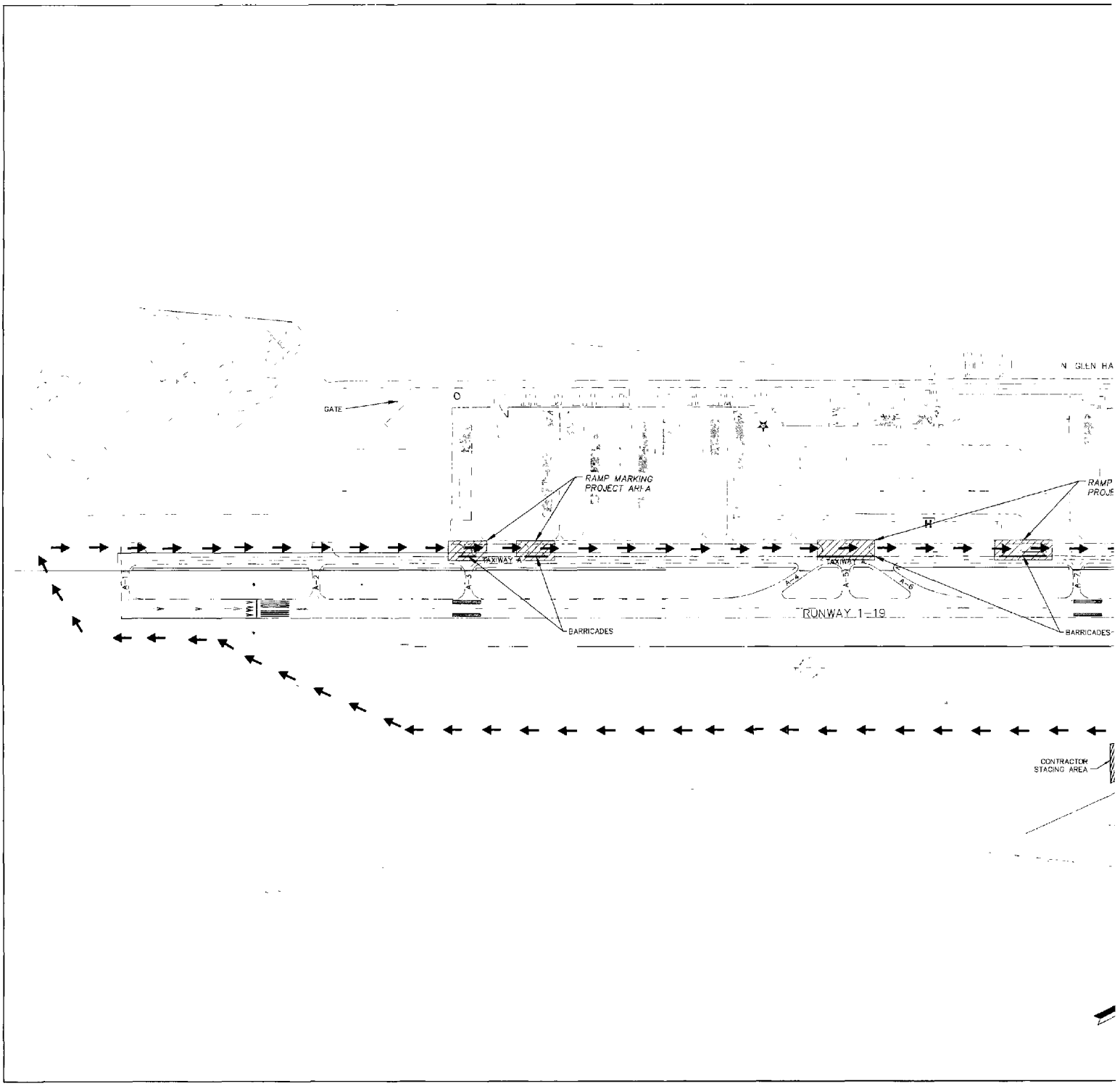
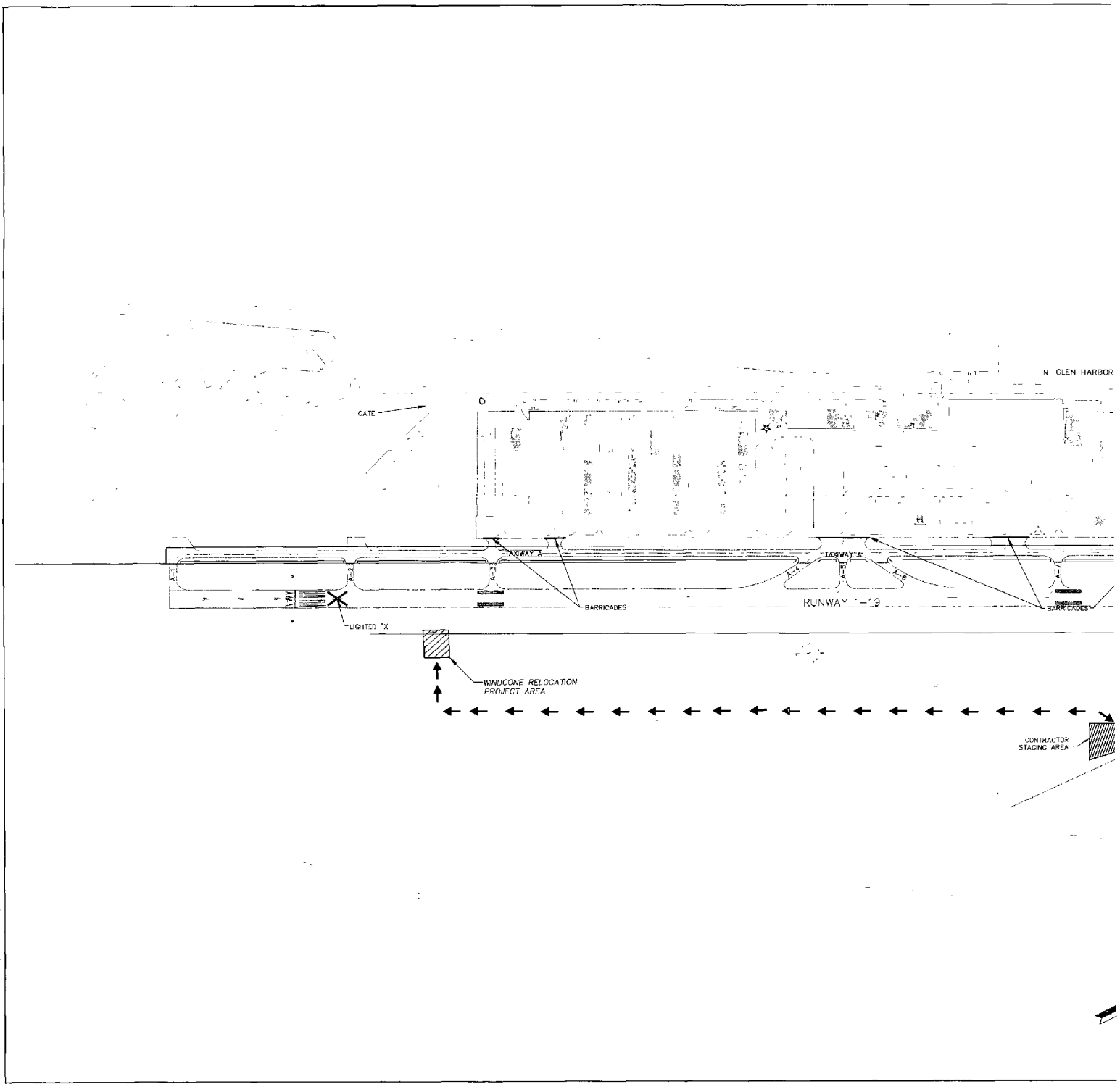
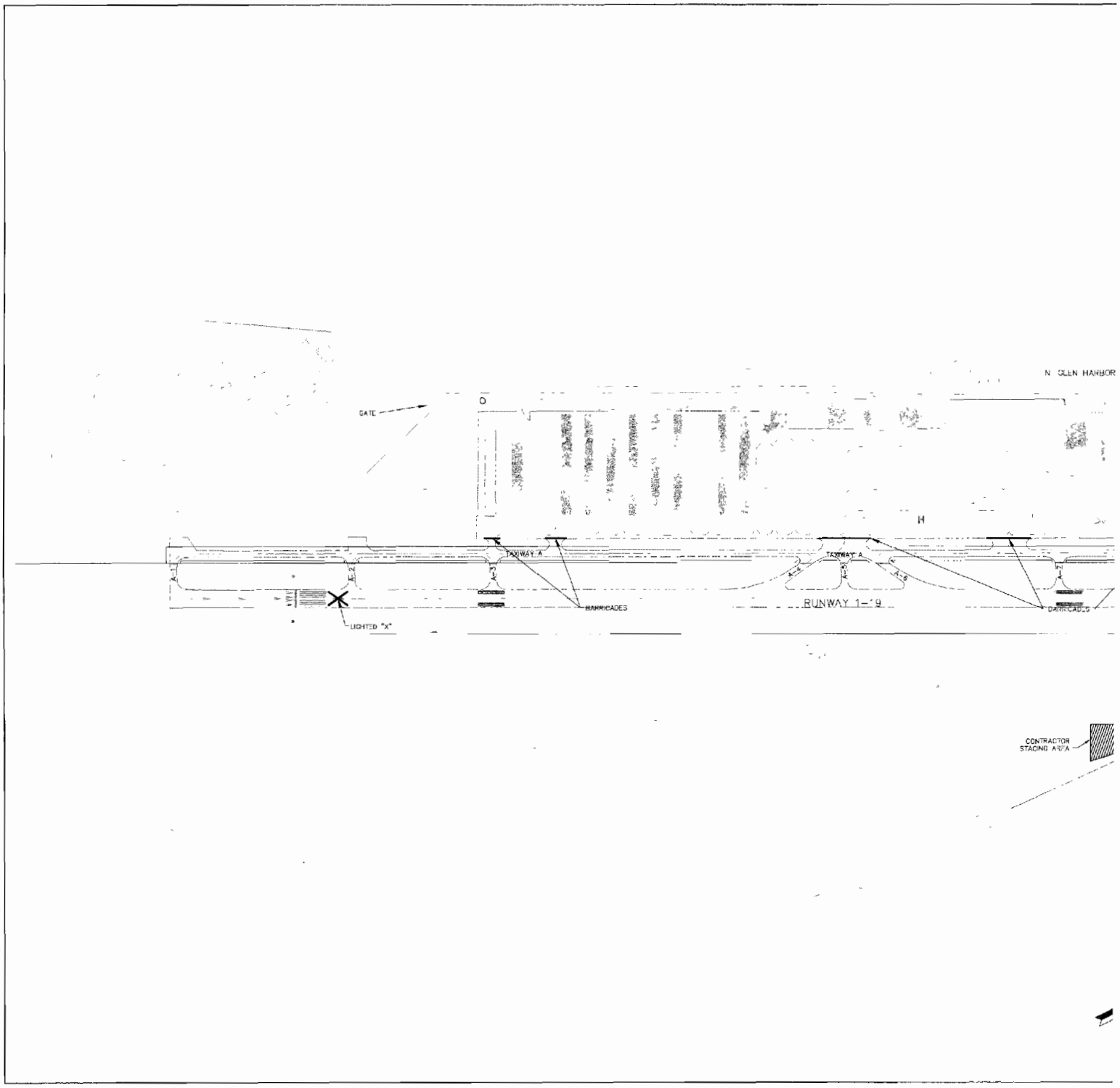
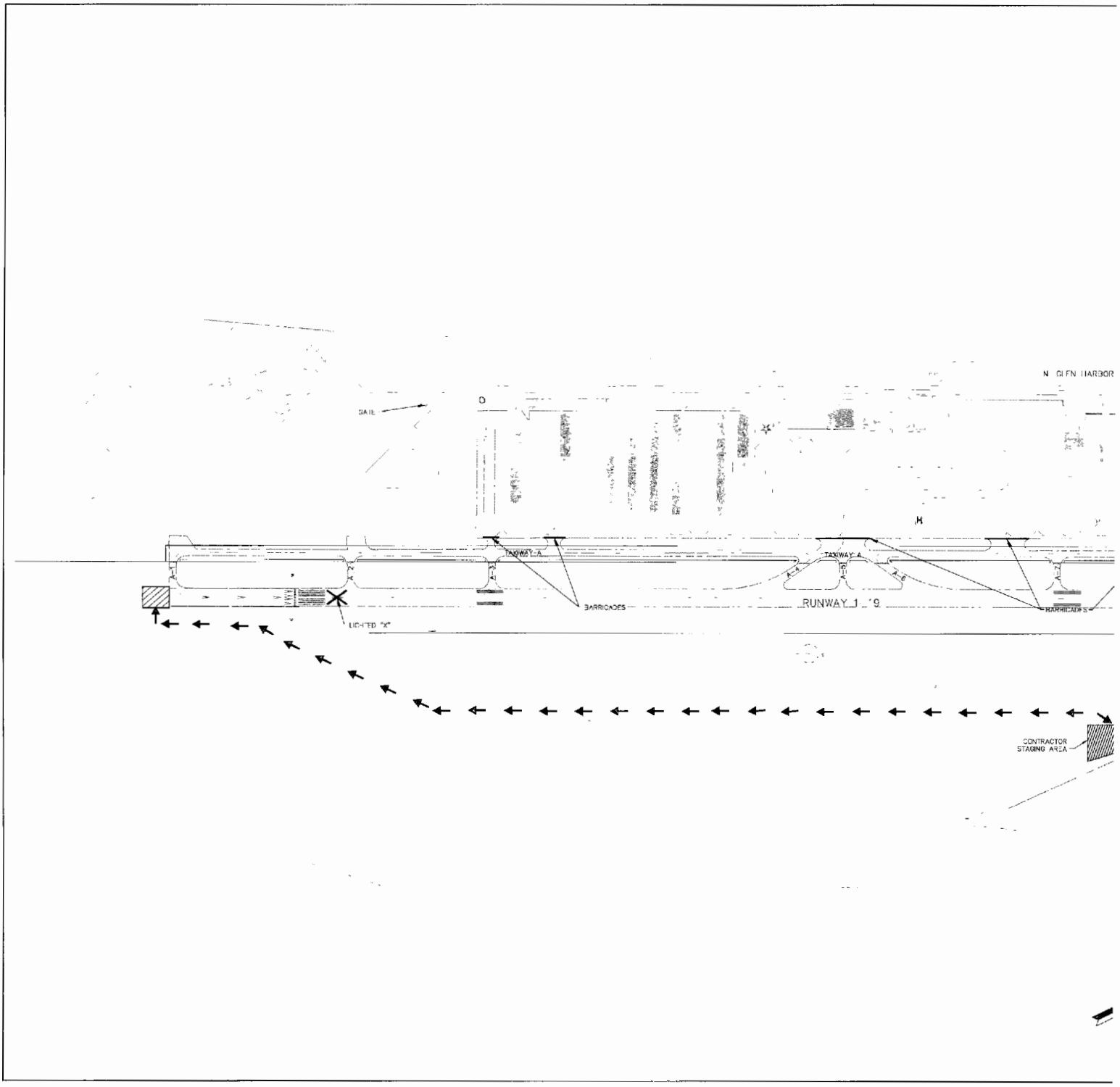

N GLEN HA
GATE
RAMP MARKING
PROJECT AREA
RAMP
PROJE
TAXIWAY A
TAXIWAY A
A-1
A-2
A-3
A-4
A-5
A-6
RUNWAY 1-19
BARRICADES
BARRICADES
CONTRACTOR
STAGING AREA


N CLEN HARBOR
GATE
TAXWAY "A"
TAXWAY "A"
BARRICADES
RUNWAY 7-19
BARRICADES
LIGHTED "X"
WINDCONE RELOCATION
PROJECT AREA
CONTRACTOR
STAGING AREA


N GLEN HARBOR
GATE
TAXIWAY A
TAXIWAY A
BARRICADES
RUNWAY 1-19
BARRICADES
LIGHTED "X"
CONTRACTOR
STAGING AREA


N GLEN HARBOR
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TAXIWAY A
BARRICADES
RUNWAY 1 19
BARRICADES
LIGHTED "X"
CONTRACTOR
STAGING AREA