



City of Chandler, Arizona  
Public Works & Utilities Department  
Capital Projects Division

# CONSTRUCTION BID

**TAXIWAY B IMPROVEMENTS PHASE 1**  
**CITY PROJECT NO.: AI2302.401; ADOT NO.: E3S4C**

**MAYOR**

**Kevin Hartke**

**VICE MAYOR**

**Christine Ellis**

**COUNCIL**

**OD Harris   Matt Orlando**

**Angel Encinas   Jane Poston   Jennifer Hawkins**

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*for* **Daniel Haskins, P.E.**  
**CIP City Engineer**

**CITY OF CHANDLER, ARIZONA**

**CONSTRUCTION BID**

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**(NOT applicable)**

## LEGAL AD DEPARTMENT



### INVITATION TO BID

#### **TAXIWAY B IMPROVEMENTS PHASE 1 CITY PROJECT NO.: AI2302.401; ADOT No.: E3S4C**

NOTICE IS HEREBY GIVEN that sealed bids will be received and date/time stamped by the City of Chandler Capital Projects Office, 215 East Buffalo Street, Chandler, Arizona 85225 until the bid submission date specified below.

All firms must be registered on the Arizona Procurement Portal (<https://app.az.gov/>) vendor registration system prior to submitting a Bid. Non-registered firms will not receive addenda notifications. Download the Bid Documents and any Addenda at [www.chandleraz.gov/business/vendor-services/capital-projects/construction-bids](http://www.chandleraz.gov/business/vendor-services/capital-projects/construction-bids). It is the contractor's sole responsibility to obtain all addenda from the City website prior to submitting their bid proposal, and to acknowledge receipt and acceptance of the addenda in their bid proposal submittal. No separate notification of addenda will be issued. The City recommends Contractors regularly check the website for updated information.

#### **PRE-BID CONFERENCE:**

	THERE WILL BE NO PRE-BID CONFERENCE
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#### **SOLICITATION QUESTIONS DUE DATE:**

<b>April 11, 2025</b> <b>5:00 p.m.</b> Arizona time	All solicitation questions must be emailed to <a href="mailto:Bid.Questions@chandleraz.gov">Bid.Questions@chandleraz.gov</a> with the subject line of: <b>"CITY PROJECT No.: AI2302.401; ADOT No.: E3S4C Taxiway B Improvements Phase 1 BID QUESTION".</b> Questions received after the due date and time will NOT be considered.
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#### **BID SUBMISSION:**

<b>April 23, 2025</b> <b>3:00 p.m.</b> Arizona time	Sealed bids must be delivered to: City of Chandler Capital Projects Office located at 215 East Buffalo Street, Chandler, Arizona, 85225. <b>Bids must be received on or before date and time specified.</b> At that time, bids will be publicly opened and read aloud in the: <b>Saguaro Conference Room</b> Bids received after the due date and time will be returned unopened without consideration. All bids must be submitted in a sealed envelope plainly marked as follows:  BID OF _____, CONTRACTOR  FOR: <i>"Taxiway B Improvements Phase 1"</i> <i>"CITY PROJECT No.: AI2302.401; ADOT No.: E3S4C"</i>
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Work under this Agreement includes:

The Taxiway B Improvements Phase I: Taxiway L to Taxiway N project includes a partial extension of the existing Taxiway B by approximately 1,300 feet. The project includes new taxiway and shoulder pavement, pavement markings, grading, lighting, and electrical improvements. The taxiway will be 40 feet wide, and the paved shoulders will be 10 feet wide, both to match existing. Work must be completed within **90** consecutive calendar days from the Notice to Proceed.

Bids must be submitted on the Proposal Form provided and be accompanied by the Bid Bond for not less than ten percent (10%) of the total bid, payable to the City of Chandler, Arizona, or a certified or cashier's check. PERSONAL OR INDIVIDUAL SURETY BONDS ARE NOT ACCEPTABLE.

The successful bidder will be required to execute the standard form of agreement for construction prior to Council award

The successful bidder must furnish a Payment Bond and Performance Bond in the amount equal to one hundred percent (100%) of the Agreement Price.

The right is hereby reserved to accept or reject any or all bids or parts thereto, to waive any informalities in any proposal and reject the bids of any persons who have been delinquent or unfaithful to any agreement with the City of Chandler.

All Bids will remain open for 90 days after the Bid opening day, but the City may, in its sole discretion, release any Bid and return the bid security prior to that date. No Bidder may withdraw his Bid during this period without written permission from the City.

Find PRELIMINARY BID RESULTS at: <https://www.chandleraz.gov/business/vendor-services/capital-projects>

Protest Policy - A protest of a proposed award must be filed WITH THE PURCHASING OFFICE within 5 calendar days of the first posting of the award recommendation. Award recommendations are posted on the Capital Projects web site or the City Clerk web site. If the due date occurs on a weekend or holiday the protest must be filed the next business day.

A Protest must include:

- The name, address and telephone number of the protester;
- The signature of the protester or its representative;
- Identification of the project and the solicitation or agreement number;
- A detailed statement of the legal and factual grounds of the protest including copies of relevant documents; and
- The form of relief requested.

City will review the protest and issue a written response.

PUBLISHED DATE:	<b><u>3/26/2025</u></b> <b><u>4/2/2025</u></b> Arizona Republic AFFIDAVIT OF PUBLICATION
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# BID SUBMITTAL LIST

This list may not include all required bid submission items. It is the Contractor's responsibility to read the entire bid and determine all items required by the submission date and time.

**DO NOT DOUBLE-SIDE ANY PART OF THE BID SUBMITTAL**

PROJECT NAME: **Taxiway B Improvements Phase 1**

CITY PROJECT NO.: **AI2302.401; ADOT No.: E3S4C**

**PLEASE INCLUDE THE FOLLOWING ITEMS IN YOUR SUBMITTAL ACCORDING TO THE DATE AND TIME LISTED IN THE INVITATION TO BID ADVERTISEMENT:**

- A. Bid Bond (Original – with Seal)
- B. Signed Proposal Acknowledgement, and licenses
- C. Bid Schedule
- D. Subcontractor's List Form
- E. Non-Collusion Bidding Certification
- F. Certificate of Insurability and Bonding
- G. Arizona Department of Revenue Privilege Tax License

## BID BOND

ARIZONA STATUTORY BID BOND PURSUANT TO  
TITLES 28, 34 AND 41,  
OF THE ARIZONA REVISED STATUTES  
(Penalty of this bond must not be less than 10% of the bid amount)

KNOW ALL MEN BY THESE PRESENTS: That, \_\_\_\_\_, (hereinafter "Principal"), as Principal, and \_\_\_\_\_, (hereinafter "Surety"), a corporation organized and existing under the laws of the State of \_\_\_\_\_, with its principal offices in \_\_\_\_\_, holding a certificate of authority to transact surety business in Arizona issued by the Director of the Department of Insurance pursuant to Title 20, Chapter 2, Article 1, as Surety, held and firmly bound unto \_\_\_\_\_, (hereinafter "Obligee"), as Obligee, in the amount of Ten Percent (10%) of the amount of the bid of Principal, submitted by Principal to the Obligee for the work described below, for the payment of which sum, the Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for construction of:

**Taxiway B Improvements Phase 1**  
**City Project No.: AI2302.401; ADOT No.: E3S4C**

NOW, THEREFORE, if the Obligee shall accept the proposal of the Principal and the Principal shall enter into an agreement with the Obligee in accordance with the terms of the proposal and give the bonds and certificates of insurance as specified in the agreement document with good and sufficient surety for the faithful performance of the agreement and for the prompt payment of labor and materials furnished in the prosecution of the agreement, or in the event of the failure of the Principal to enter into the agreement and give the bonds and certificates of insurance, if the Principal pays to the Obligee the difference not to exceed the penalty of the bond between the amount specified in the proposal and such larger amount for which the Obligee may in good faith contract with another party to perform the work covered by the proposal then this obligation is void. Otherwise it remains in full force and effect provided, however, that this bond is executed pursuant to the provisions of Section 34-201, Arizona Revised Statutes, and all liabilities on this bond shall be determined in accordance with the provisions of that section to the extent as if it were copied at length herein.

Witness our hands this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_\_\_

\_\_\_\_\_  
**Principal** SEAL

\_\_\_\_\_  
**SURETY** SEAL

By: \_\_\_\_\_

By: \_\_\_\_\_

Attorney-in-Fact

Its: \_\_\_\_\_

\_\_\_\_\_  
**AGENCY OF RECORD**

\_\_\_\_\_  
**AGENCY ADDRESS**

CITY OF CHANDLER  
CHANDLER, ARIZONA

**Taxiway B Improvements Phase 1**  
**City Project No.: AI2302.401; ADOT No.: E3S4C**

**PROPOSAL ACKNOWLEDGEMENT**

PROPOSAL to the City Engineer of the City of Chandler,  
In compliance with the Advertisement for Bids, the undersigned bidder:

Having examined the agreement documents, site of work, and being familiar with the conditions to be met, hereby submits the following Proposal for furnishing the material, equipment, labor and everything necessary for the completion of the work listed and agrees to execute the agreement documents and furnish the required bonds and certificates of insurance for the completion of said work, at the locations and for the prices set forth on the inside pages of this form.

Understands that construction of this project shall be in accordance with all applicable Uniform Standard Specifications and Standard Details except as otherwise required by the Project Plans and Project Specific Provisions.

Understands that the Proposal shall be submitted with a Proposal guarantee of cash, certified check, cashier's check, or surety bond for an amount of not less than ten percent (10%) of the amount bid.

Agrees that upon receipt of Notice of Award from the City of Chandler, the undersigned bidder will execute the agreement documents.

Work shall be completed within **90** consecutive calendar days, beginning with the day following the starting date specified in the Notice to Proceed. Said Notice will be issued in accordance with the Project Specific Provisions "NOTICE TO PROCEED," or, when, in the opinion of the Engineer, sufficient materials are, or will be available for the continuous prosecution of the work.

Acknowledges that bid prices submitted include all applicable sales and/or use taxes, and no further compensation will be approved for these items.

The Bidder hereby acknowledges receipt of and agrees that the submitter's Proposal is based on the following Addenda:

Addendum	Date Received	Addendum No.	Date Received
_____	_____	_____	_____
_____	_____	_____	_____

## **PROPOSAL ACKNOWLEDGEMENT**

**THIS BID IS SUBMITTED BY:** \_\_\_\_\_,  
a corporation organized under the laws of the State of \_\_\_\_\_; a  
partnership consisting of \_\_\_\_\_;  
or individual trading as \_\_\_\_\_  
and is the holder of an Arizona State Contractor's License: \_\_\_\_\_

### **ATTACH PHOTOCOPY**

Classification \_\_\_\_\_ No. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Failure to fill in the information above, regarding the bidder being a holder of Arizona State Contractor's License is grounds for rejection of the bid.

Joint venture bid proposals will not be accepted for projects bidding in the amount (for base bid) of less than \$5 million dollars.

Contractors are reminded it is a violation of State law to submit a bid if not properly licensed. Bids submitted without designating the Contractor's license classification and number, in the spaces provided above, shall be rejected. Bids submitted by Contractors without the required license shall be rejected.

Contractor acknowledges by signing below that bid prices submitted include all applicable sales and/or use taxes, and no further compensation shall be approved for these items. If there is a conflict between the unit bid price and the unit price extension for a particular pay item, the unit prices shall govern, per MAG 102.5. Also, per MAG 102.7, a proposal shall be considered irregular and may be rejected if there are unauthorized additions, statements, conditional or alternate bids, or irregularities of any kind.

Respectfully submitted,

\_\_\_\_\_  
Firm

\_\_\_\_\_  
Federal Tax ID Number

\_\_\_\_\_  
Address

\_\_\_\_\_  
City, State and Zip Code

\_\_\_\_\_  
Phone

\_\_\_\_\_  
By (Signature Required)

\_\_\_\_\_  
Name and Title (Print)

\_\_\_\_\_  
Email Address

NAME OF BIDDER: \_\_\_\_\_

CITY OF CHANDLER

**Taxiway B Improvements Phase 1**  
**City Project No.: AI2302.401; ADOT No.: E3S4C**

**BID SCHEDULE**

No.	Spec.No.	Description	Est. Qty.	Unit	Unit Price	Extended Price
1	C-100.14.1	Contractor Quality Control Program (CQCP)	1	LS		
2	C-102-6.1	Storm Water Pollution Prevention Plan (SWPPP)	1	LS		
3	C-105-6.1	Mobilization	1	LS		
4	SP-50.01.1	Location of Underground Utilities	1	LS		
5	SP-60.05.1	Airfield Safety and Security	1	LS		
6	SP-80.01.1	Riprap (D50=6-Inch, T = 12-Inch)	31	SY		
7	P-101-5.1	Sawcut AC Pavement (Full Depth ± 4-Inch)	421	LF		
8	P-101-5.2	Remove AC Pavement (Full Depth ± 4-Inch)	583	SY		
9	P-152-4.1	Unclassified Excavation	1,100	CY		
10	P-152-4.2	Unsuitable Excavation and Replacement, Backfill and Compaction	220	CY		
11	P-152-4.3	Compacted Subgrade (12-Inch Depth)	9,251	SY		
12	P-208-5.1	Taxiway Aggregate Base Course (9-Inch Depth)	6,318	SY		
13	P-208-5.2	Shoulder Aggregate Base Course (6-Inch Depth)	2,933	SY		
14	P-401-8.1	Taxiway Asphalt Surface Course (4-Inch Depth, PG 70-22)	6,318	SY		
15	P-403-8.1	Shoulder Asphalt Surface Course (3-Inch Depth, PG 70-22)	2,933	SY		
16	P-620-5.1	Obliterate & Seal Pavement Markings	1,583	SF		
17	P-620-5.2	Temporary Pavement Markings	3,975	SF		
18	P-620-5.3	Permanent Pavement Markings	3,975	SF		
19	T-901-5.1	Seeding	1.9	AC		
20	L-100-5.1	Remove and Salvage Existing Taxiway Edge Light and Isolation Transformer Demolish Base Can	6	EA		
21	L-100-5.2	Remove and Salvage Existing Taxiway Edge Light and Isolation Transformer and Return to Owner - Base Can to Remain	3	EA		
22	L-100-5.3	Remove Existing Conductors Back to Next Adjacent Light fixture or Hand Hole, Conduit to Remain	726	LF		
23	L-100-5.4	Excavate and Remove Existing Conduit and Conductors	418	LF		
24	L-100-5.5	Remove and Salvage Existing Airfield Guidance Sign and Return to Owner - Remove Concrete Sign Base	2	EA		
25	L-100-5.6	Remove and Salvage Existing Airfield Guidance Sign and Isolation Transformer and	1	EA		

**Taxiway B Improvements Phase 1**  
**City Project No.: AI2302.401; ADOT No.: E3S4C**  
**BID SCHEDULE - CONTINUED**

		Return to Owner, Sign Base to Remain				
26	L-108-5.1	L-824, Type C, 1/C #8 AWG, 5kV Cable	4,525	LF		
27	L-108-5.2	L-824, Type C, 2/C #8 AWG, 5kV Cable	941	LF		
28	L-110-5.1	Single-Way 1-2" Conduit Direct Buried	3,424	LF		
29	L-110-5.2	Multiple-Way 2-2" Conduit Concrete Encased	180	LF		
30	L-110-5.3	Multiple-Way 4-2" Conduit Concrete Encased	95	LF		
31	L-115-5.1	New 2'x3'x3' Hand Hole with Aircraft-Rated Lid with Spring Assisted Opening	2	EA		
32	L-115-5.2	Install New Steel Blank Cover on Existing L-867 Base Can with New Bolts	3	EA		
33	L-125-5.1	New L-861T Quartz Taxiway Edge Light and Isolation Transformer on New L-867 Base Can	37	EA		
34	L-125-5.2	New L-858 (L) LED Size 2, Style 3, Class 2, 2-Module Airfield Guidance Sign on New Concrete Base	2	EA		
35	L-125-5.3	New L-858 (L) LED Size 2, Style 3, Class 2, 3-Module Airfield Guidance Sign on New Concrete Base	3	EA		
36	L-125-5.4	New L-858(L) LED Size 2, Style 3, Class 2, 3-Module Airfield Guidance Sign on Existing Concrete Sign Base	1	EA		
37	L-125-5.5	New L-858 Size 2, Unlighted Taxiway Ending Marker Sign on New Concrete Sign Base	1	EA		

BASE BID (Items 1- 37 inclusive)	\$ _____
	(In Numbers)
_____ (In Words)	Dollars
_____ (In Words)	Cents

**Note 1: Bidders must fill in all blank spaces with an entry. Bids submitted with blank spaces will be considered "Non-Responsive".**

**Note 2: Bids will be opened and read aloud at an open public meeting at the time and place designed in the invitation for bids. Bids will not be modified after the bid opening. A bidder withdrawing a bid after the bid opening will be deemed non-responsible and the City may make a claim against the bidder's bid bond.**

**Note 3: The City reserves the right to determine the low bidder based on the Base Bid with or without any Bid Alternate(s).**

## SUBCONTRACTOR'S LIST FORM

**Taxiway B Improvements Phase 1**  
**City Project No.: AI2302.401; ADOT No.: E3S4C**

If Bidder intends to subcontract any portion of this Agreement, the bidder must submit the name, address, and contractor's license number (if applicable) of each subcontractor, including the work component of such subcontracting. Include this form with the bid submittal documents. Prime Contractor must self-perform according to MAG Specification 108.2. Bidder may make multiple copies of this form as needed.

<b>Company Name:</b>		<b>Company Name:</b>	
Contact Name:		Contact Name:	
Contact Email:		Contact Email:	
Contact Phone:		Contact Phone:	
Work Component:		Work Component:	
Percentage of Total Work Performed:		Percentage of Total Work Performed:	

<b>Company Name:</b>		<b>Company Name:</b>	
Contact Name:		Contact Name:	
Contact Email:		Contact Email:	
Contact Phone:		Contact Phone:	
Work Component:		Work Component:	
Percentage of Total Work Performed:		Percentage of Total Work Performed:	

<b>Company Name:</b>		<b>Company Name:</b>	
Contact Name:		Contact Name:	
Contact Email:		Contact Email:	
Contact Phone:		Contact Phone:	
Work Component:		Work Component:	
Percentage of Total Work Performed:		Percentage of Total Work Performed:	
Subcontractor Total Work Performed:	\$	Overall Bid Total:	\$
Overall Prime Contractor Self-performance %:			

## NON-COLLUSION BIDDING CERTIFICATION

(STATE OF )  
ss.  
(COUNTY OF )

I, \_\_\_\_\_ of the City of \_\_\_\_\_,  
in the County of \_\_\_\_\_ and the State of \_\_\_\_\_, of full age,  
being duly sworn according to the law of my oath depose and say that:

I am \_\_\_\_\_ a, \_\_\_\_\_  
(Name) (Title, Position, etc.)

of the firm of \_\_\_\_\_, the Bidder making  
the Bid for City of Chandler, **Taxiway B Improvements Phase 1, City Project No. A12302.401; ADOT No.:  
E3S4C** and that I executed the said Bid with full authority so to do; that said Bidder has not, directly or  
indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of  
free, competitive bidding in connection with the above named Project; and that all statements contained in said  
Bid and in this affidavit are true and correct, and made with full knowledge that the City of Chandler relies upon  
the truth of the statements contained in said Bid and in the statements contained in this affidavit in awarding  
the Contract for the said Project.

I further warrant that no person or selling agency has been employed or retained to solicit or secure such  
Contract upon an agreement of understanding, for a commission, percentage, brokerage or contingent fee,  
except bonafide employees or bonafide established commercial or selling agencies maintained by:

\_\_\_\_\_  
(Signature of Bidder)

\_\_\_\_\_  
(Printed or Typed Name of Bidder)

Sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, in the County  
of \_\_\_\_\_,

\_\_\_\_\_, State of \_\_\_\_\_.

\_\_\_\_\_  
(Notary Public)

\_\_\_\_\_



## **CERTIFICATE OF INSURABILITY AND BONDING**

I hereby certify that as Bidder to City of Chandler **Taxiway B Improvements Phase 1, City Project No.: AI2302.401; ADOT No.: E3S4C**, I am fully aware of the City of Chandler's Insurance and Bonding Requirements for Contractors and that by the submission of this Bid Proposal, assure the City of Chandler that I am able to produce the insurance and bonding coverage required should I be selected to be the successful bidder.

Should I be selected to be the successful bidder by the City of Chandler, and then become unable to produce the insurance and bonding coverage specified within ten working days I am fully aware and understand that my Bid Proposal will be rejected by the City of Chandler, and that I will forfeit my posted Bid Bond.

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Signature of Bidder

---

Title

---

Date

**ARIZONA DEPARTMENT OF REVENUE  
PRIVILEGE TAX LICENSE**

**PROJECT NAME:** Taxiway B Improvements Phase 1

**CITY PROJECT NUMBER:** AI2302.401; ADOT No.: E3S4C

**ATTACH, TO THIS FORM, CURRENT PRIVILEGE TAX LICENSE CERTIFICATE.**



**CITY OF CHANDLER, ARIZONA  
PUBLIC WORKS & UTILITIES DEPARTMENT  
CAPITAL PROJECTS DIVISION**

**CONSTRUCTION AGREEMENT**

**TAXIWAY B IMPROVEMENTS PHASE 1**

**CITY PROJECT NO.: AI2302.401; ADOT No.: E3S4C**

**MAYOR**

**Kevin Hartke**

**VICE MAYOR**

**Christine Ellis**

**COUNCIL**

**OD Harris    Matt Orlando**

**Angel Encinas    Jane Poston    Jennifer Hawkins**

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**Daniel Haskins, P.E.  
CIP City Engineer**

**CITY OF CHANDLER, ARIZONA**

**TAXIWAY B IMPROVEMENTS PHASE 1**

**CITY PROJECT NO.: AI2302.401; ADOT No.: E3S4C**

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**CONSTRUCTION SERVICES AGREEMENT**  
**CITY PROJECT NO.: AI2302.401; ADOT No.: E3S4C**

This Agreement ("Agreement") is made and entered into on the \_\_\_\_ day of \_\_\_\_\_, 2025, by and between City of Chandler, an Arizona municipal corporation, hereinafter called "City" and **CONTRACTOR NAME** the "Contractor" designated below (City and Contractor may individually be referred to as "Party" and collectively referred to as "Parties").

City and Contractor agree as follows:

**ARTICLE 1 - PARTICIPANTS AND PROJECT**

**CITY:** CIP City Engineer: **Daniel Haskins, P.E.**  
Public Works & Utilities Department  
P.O. Box 4008, Mail Stop 407 Chandler, AZ 85244-4008  
Phone: **480-782-3335** Email: **Daniel.haskins@chandleraz.gov**

**CITY:** Construction Project Manager: **Raymond.Potts**  
Public Works & Utilities Department  
P.O. Box 4008, Mail Stop 407 Chandler, AZ 85244-4008  
Phone: **480-782-3326** Email: **Raymond.Potts@chandleraz.gov**

<b>Contractor:</b>	Legal Company Name:	<b>CONTRACTOR NAME</b>
	Mailing Address:	
	Physical Address:	
	Arizona Roc No.:	
	Federal Tax Id No.:	
	State Where Organized:	
	Business Organization:	
	Statutory Agent Name:	
	Statutory Agent Mailing Address:	
	Statutory Agent Physical Address:	
	Contractor's Authorized Project Representative:	
	Name:	
	Title:	
	Phone:	
	<b>Email:</b>	

**PROJECT DESCRIPTION:**

The Taxiway B Improvements Phase I: Taxiway L to Taxiway N project includes a partial extension of the existing Taxiway B by approximately 1,300 feet. The project includes new taxiway and shoulder pavement, pavement markings, grading, lighting, and electrical improvements. The taxiway will be 40 feet wide, and the paved shoulders will be 10 feet wide, both to match existing.

**PROJECT LOCATION:**

Chandler Municipal Airport

## **ARTICLE 2 - AGREEMENT DOCUMENTS**

### **2.1 AGREEMENT DOCUMENTS**

The Agreement between City and Contractor will consist of the following Agreement Documents:

1. This Construction Services Agreement and all of its Exhibits, including Project Plans and Technical Specifications.
2. General Conditions and General Conditions Appendices, incorporated by reference.
3. Project Specific Special Provisions as set forth in Exhibit A, incorporated by reference.
4. Project Bid Proposal.

2.2 In the event of any inconsistency, conflict, or ambiguity between or among the Agreement Documents, the Agreement Documents will take precedence as described in Section 14.1.4 of the General Conditions.

### **2.3 DEFINITIONS**

The definitions in Section 2 of the General Conditions apply to all the Agreement Documents, including this Agreement.

## **ARTICLE 3 - CONSTRUCTION SERVICES**

### **3.1 GENERAL**

3.1.1 Scope of Work. All terms and conditions are set forth in the Agreement. Any terms and conditions and exceptions noted in the Contractor's proposal or other documents do not apply unless agreed to in this Agreement or an approved addendum.

3.1.2 Contractor agrees this is a Unit Price Agreement. Contractor agrees at its own cost and expense, to do all Work necessary required to fully, timely and properly complete the construction of the Project in strict accordance with the Agreement Documents in a good and workmanlike manner, free and clear of all claims, liens, and charges whatsoever, in the manner and under the conditions specified, within the Agreement time.

3.1.3 Contractor must provide all of the labor and materials, and perform the Work in accordance with Section 4 of the General Conditions. Some, but not all, of the major components of the Construction Services and the corresponding subsections of Section 4 of the General Conditions are set forth below.

- 3.1.4 At all times relevant to this Agreement and performance of the Work, the Contactor must fully comply with all Laws, Regulations, or Legal Requirements applicable to City, the Project and the Agreement, including, without limitation, those set forth on attached Exhibit A.
- 3.1.5 Contractor must perform the Work under this Agreement using only those firms, team members and individuals designated by Contractor consistent with Contractor's accepted Bid, or otherwise, approved by City pursuant to the General Conditions. No other entities or individuals may be used without the prior written approval of the Project Manager.
- 3.1.6 Contractor must comply with all terms and conditions of the General Conditions.
- 3.1.7 In the event of a conflict between this Agreement and the General Conditions or an exhibit hereto or appendix thereto, the terms of this Agreement will control.
- 3.1.8 Ownership of Work Product. Notwithstanding anything to the contrary in this Agreement, all Work Product prepared or otherwise created in connection with the performance of this Agreement, including the Work, are to be and remain the property of City. For purposes of this provision, "Work Product" will include all designs, drawings, plans, specifications, ideas, renderings and other information or matter, in whatever form created (e.g., electronic or printed) and in all media now known or hereinafter created. All Work Product will be considered Work Made for Hire as defined in the United States Copyright Act 17 U.S.C. § 101 (Copyright Act). If for any reason, any such Work is found not to be a Work Made for Hire, Contractor hereby transfers and assigns ownership of the copyright in such Work to City. The rights in this Section are exclusive to City in perpetuity.

**3.2 CONTRACTOR'S PRE-AGREEMENT AND PRE-WORK DELIVERABLES**

- 3.2.1 The Contractor must provide the Deliverables in accordance with Section 4.2 of the General Conditions.

**3.3 PRE-CONSTRUCTION CONFERENCE**

Contractor must attend the Pre-Construction Conference in accordance with Section 4.3 of the General Conditions.

**3.4 PERFORMANCE OF THE WORK (INCLUDING FIELD MEASUREMENTS, SUBCONTRACTORS, AND SUPPLIERS)**

Contractor must perform the Work in accordance with Section 4.4 of the General Conditions.



**3.5 CONTROL OF THE PROJECT SITE**

Contractor must control and maintain the Project Site in accordance with Section 4.5 of the General Conditions.

**3.6 PROJECT SAFETY**

Contractor must implement and enforce Project safety in accordance with Section 4.6 of the General Conditions.

**3.7 MATERIALS QUALITY, SUBSTITUTIONS AND SHOP DRAWINGS**

Contractor must provide materials testing and submit substitute materials and Shop Drawings in accordance with Section 4.7 of the General Conditions.

**3.8 PROJECT RECORD DOCUMENTS**

Contractor must maintain and make available the Project Record Documents in accordance with Section 4.8 of the General Conditions.

**3.9 WARRANTY AND CORRECTION OF DEFECTIVE WORK**

Contractor must provide warranties and correct defective Work in accordance with Section 4.9 of the General Conditions.

**ARTICLE 4 - CITY RESPONSIBILITIES**

4.1 City will have the responsibilities, and provide the information specified in, and subject to the conditions set forth in, Section 5 of the General Conditions.

**ARTICLE 5 - AGREEMENT TIME**

**5.1 GENERAL**

5.1.1 The total Agreement Duration is **90** Calendar Days (including Substantial Completion by **60** Calendars Days and Final Acceptance by **90** Calendar Days).

5.1.2 The Agreement Time will start with the Notice to Proceed (NTP) and end with Final Acceptance, as set forth in Article 5.4 below.

5.1.3 The Agreement Time will be as set forth in the Project Schedule. Contractor agrees that it will commence performance of the Work and complete the Project through Final Acceptance within the Agreement Time.

5.1.4 Time is of the essence of this Agreement for the Project, and for each phase and designated Milestone thereof.

- 5.1.5 Failure on the part of Contractor to adhere to the approved Project Schedule will be deemed a material breach and sufficient grounds for termination of this Agreement by City.

## 5.2 PROJECT SCHEDULE

- 5.2.1 The Project Schedule will be updated and maintained throughout Contractor's performance under this Agreement in accordance with Section 6.2 of the General Conditions.

- 5.2.2 Work must be completed to meet the following milestones after the Notice to Proceed:

	Milestone		Time	Liquidated damages for delay	
1.		within	days	\$	per calendar day

## 5.3 SUBSTANTIAL COMPLETION

Substantial Completion must be achieved no later than the Substantial Completion Date set forth in the Project Schedule. Substantial Completion will be determined in accordance with Section 6.3 of the General Conditions.

## 5.4 FINAL ACCEPTANCE

- 5.4.1 Final Acceptance will be obtained within the time period set forth in the Project Schedule.

- 5.4.2 Final Acceptance will be issued pursuant to Section 6.5 of the General Conditions.

## 5.5 LIQUIDATED DAMAGES

- 5.5.1 Substantial Completion Liquidated Damages. Contractor acknowledges and agrees that if Contractor fails to obtain Substantial Completion of the Work within the Agreement Time, City will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be extremely difficult to ascertain. Therefore, City and Contractor agree that if Contractor fails to achieve Substantial Completion of the Work within the Agreement Time, City will be entitled to retain or recover from Contractor, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9.

- 5.5.2 Final Acceptance Liquidated Damages. For the same reasons set forth in Article 5.5.1 above, City and Contractor further agree that if Contractor fails to achieve Final Acceptance of the Work within the Agreement Time, City will be entitled to retain or recover from Contractor, as liquidated damages and not as a penalty, the sum per

calendar day as indicated in MAG § 108.9 commencing from the actual date of Substantial Completion or Final Acceptance as required under the Agreement.

5.5.3 MAG Liquidated Damages. Liquidated damages provisions in MAG § 108.9 will apply.

5.5.4 City may deduct liquidated damages described in this Article 5.5 from any unpaid amounts then or thereafter due Contractor under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due Contractor will be payable to City at the demand of City, together with interest from the date of the demand at the highest lawful rate of interest payable by Contractor.

## 5.6 **MUTUAL WAIVER OF CONSEQUENTIAL DAMAGES ONLY**

5.6.1 Contractor and City waive claims against each other for consequential damages arising out of or relating to this Agreement. This mutual waiver includes.

1. Damages incurred by City for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
2. Damages incurred by Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

5.6.2 This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination of this Agreement. Nothing contained in this Article 5.6 will be deemed to preclude an award of liquidated damages, when applicable, in accordance with Article 5.5 above.

5.6.3 Nothing herein will be deemed to constitute a waiver of any other remedy available to City in the event of Contractor's default under this Agreement prior to full performance of the Work including, as applicable, specific performance or completion of the Work on behalf of Contractor, the cost and expense of which will be offset against any monies then or thereafter due to Contractor (if any) and otherwise immediately reimbursed to City by Contractor.

## **ARTICLE 6 - AGREEMENT PRICE**

### 6.1 **AGREEMENT PRICE**

6.1.1 In exchange for Contractor's full, timely, and acceptable performances and construction of the Work under this Agreement, and subject to all of the terms of

this Agreement, City will pay Contractor the "Agreement Price," which is **\$Agreement Price**.

- 6.1.2 The Agreement Price is all-inclusive and specifically includes all fees, cost, insurance and bond premiums, and taxes of any type necessary to fully, properly and timely perform and construct Work.

6.2 **CHANGES TO AGREEMENT PRICE**

Shall be determined under Section 9 of the General Conditions.

**ARTICLE 7 - PAYMENT**

Payments will be made to Contractor in accordance with Section 8 of the General Conditions.

**ARTICLE 8 - CHANGES TO THE AGREEMENT**

Changes to the Agreement may be made in strict accordance with Section 9 of the General Conditions.

**ARTICLE 9 - SUSPENSION AND TERMINATION**

This Agreement may be suspended or terminated in accordance with Section 10 of the General Conditions.

**ARTICLE 10 - INSURANCE AND BONDS**

- 10.1 Contractor must provide insurance in accordance with Sections 11.1 through 11.3 of the General Conditions. Contractor must provide proof of such insurance and all required endorsements in forms acceptable to City prior to commencing any Work under this Agreement.
- 10.2 Contractor must provide performance and payment bonds to City in Accordance with Section 11.4 of the General Conditions and A.R.S. § 34-222.
- 10.3 Failure to provide proof of insurance and the required endorsements, or the required bonds, in forms acceptable to City, will be a material breach and grounds for termination for cause of this Agreement.

**ARTICLE 11 - INDEMNIFICATION**

Contractor must have and assume the indemnity obligations set forth in Section 12 of the General Conditions.

## **ARTICLE 12 - DISPUTE RESOLUTION**

Any claims or disputes relating to this Agreement will be resolved according to the dispute resolution process set forth in Section 13 of, and Appendix 6 to, the General Conditions.

**ARTICLE 13 - FORCED LABOR OF ETHNIC UYGHURS PROHIBITED** By entering into this Agreement, Contractor certifies and agrees Contractor does not currently use and will not use for the term of this Agreement: (i) the forced labor of ethnic Uyghurs in the People's Republic of China; or (ii) any goods or services produced by the forced labor of ethnic Uyghurs in the People's Republic of China; or (iii) any contractors, subcontractors or suppliers that use the forced labor or any goods or services produced by the forced labor of ethnic Uyghurs in the People's Republic of China.

SIGNATURE PAGE TO FOLLOW

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement through their duly authorized representatives and bind their respective entities as of the effective date.

**"CITY" CITY OF CHANDLER**

**"CONTRACTOR"  
CONTRACTOR NAME**

\_\_\_\_\_  
MAYOR

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**RECOMMENDED BY:**

\_\_\_\_\_  
Print Name

\_\_\_\_\_  
Daniel Haskins, P.E.  
CIP City Engineer

\_\_\_\_\_  
Title

**APPROVED AS TO FORM:**

\_\_\_\_\_  
Signer Email Address

\_\_\_\_\_  
City Attorney

**ATTEST:**

\_\_\_\_\_  
City Clerk

\_\_\_\_\_  
Seal

**EXHIBIT A**  
**PROJECT SPECIFIC**  
**SPECIAL PROVISIONS**

**4.2.7 Aerial Construction Photography**

General Conditions Section 4 Subsections 4.2.7.1 & 4.2.7.2 are not applicable to this project.

**4.2.8 Government Approvals and Permits**

General Conditions Section 4 Subsection 4.2.8.1, City permit fees will be paid internally by the City and all other fees will be the responsibility of the Contractor.

**Subletting of Agreement**

Contractor must perform, with his own organization, work amounting to not less than 50 percent of the total Agreement cost.

Failure to submit Subcontractor's List Form, demonstrating self-performance not less than 50 percent of the total Agreement cost, will cause the bid to be deemed non-responsive.

Bidders should contact the Arizona Registrar of Contractors for information on license requirements.

## **EXHIBIT B**

### **GENERAL CONDITIONS**





# GENERAL CONDITIONS

Approved date: July 20, 2022

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**Appendix 9 – Cost of the Work (Applicable solely to Construction Manager at Risk and Job Order Contracting)**

**Appendix 10 Landscape Establishment Period**

## **SECTION 1 - SCOPE OF THESE GENERAL CONDITIONS**

These General Conditions encompass provisions that apply, and are incorporated into all construction Agreements entered into by the City of Chandler, unless otherwise specifically excluded in the executed Agreement.

## **SECTION 2 - GENERAL DEFINITIONS**

Allowance: A specific amount for a specific item of Work, if any, that City agrees has not been sufficiently designed, detailed, or selected (including design changes from 90% to 100% as authorized by and at the discretion of the City) at the time the Agreement Price is agreed to for Contractor to provide a definitive price.

Alternate Systems Evaluations or Alternative Analysis: Alternatives for design, means and methods or other scope considerations that are evaluated using value analysis principles and have the potential to reduce construction costs while still delivering a quality and functional Project that meets City requirements.

Change Order: A written instrument issued after execution of the Agreement Documents signed by City and Contractor, stating their agreement upon all of the following: the addition, deletion or revision in the scope of services or deliverables; the amount of the adjustment to the Agreement Price, the extent of the adjustment to the Agreement Time, or modifications of other agreement terms. The Agreement Price and the Agreement Time may be changed only by Change Order.

Consultant: Person or firm that provides professional services.

City (Owner or OWNER): City of Chandler, a municipal corporation, with whom Contractor has entered into the Agreement and for whom the Work or Services are to be provided pursuant to the Agreement(s).

Contingent Bid Items: This is a minor bid item which is likely, but not certain, to occur during the course of work. If the Engineer determines that this work is required, the Contractor will accomplish the work and payment will be made based on the contingent unit bid price included in the proposal. Since the quantity listed in the proposal is primarily for bid comparison, the amount of work required by the Engineer may vary materially from this.

Agreement: The written agreement executed between City and Contractor, including all of the Agreement Documents.

Agreement Documents: The documents which together form the Agreement between City and Contractor, as identified in Article 2 of the Agreement, or are otherwise incorporated into the Agreement, including the Agreement, the exhibits thereto, these General Conditions, any Notice to Proceed, and any Job Order (if applicable), the Plans and Specifications, Project Schedule, written and properly executed Change Orders, MAG Specifications and City's amendments thereto, and any other documents so designated in the Agreement.

Agreement Price: The agreed-upon price to be paid to Contractor for full, timely, and acceptable completion of the Work or Services under the terms of the Agreement.

Agreement Time(s): The number of calendar days or the dates related to the applicable phase, Substantial Completion, or Final Acceptance as stated in Agreement Documents. Agreement Time starts

with the Notice to Proceed (NTP) and ends with Final Acceptance. The Agreement Time is set forth in the Agreement and is based upon the Project Schedule agreed to by City in writing.

Contractor: The person or business association with whom City has entered into an agreement for construction related Work or Services in relation to the Project at issue.

Contractor Payment Request: The form that is accepted by City and used by Contractor in requesting progress payments or final payment and which must include such supporting documentation as is required by the Agreement Documents or City.

Construction Budget: The City's budget for construction of the Project.

Construction Documents: The Plans, Specifications, and Drawings prepared and issued by the Design Professional and approved by City for construction, meaning the documents are sealed by the Design Professional (as required), acceptable for permitting and incorporated into the Agreement by this reference. All amendments and modifications to the Construction Documents must be approved in writing by City prior to incorporation into the Agreement.

Cost of the Work: The term Cost of the Work will mean costs necessarily incurred by Contractor in the proper performance of the Work. Such costs will be at rates not higher than the standard paid at the place of the Project except with prior consent of City.

Critical Path Method (CPM): A scheduling technique which identifies the logical sequence of the activities occurring in a Construction Project, the anticipated time required to complete each activity in the Project, and the activities that must be completed on schedule to finish the Project within the anticipated time. Typically, activities are arranged in a network that shows both activities and their dependencies. CPM is also used as a management technique which enables contracting parties to predict when activities may occur so that resources can be effectively used and limitations can be identified.

Critical Path: Critical Path is the sequence of project network activities which add up to the longest overall duration. Once established in the Project Schedule, the Critical Path for the Project must not be changed without prior written approval of City.

Day: Calendar day(s) unless otherwise specifically stated in the Agreement Documents.

Design Professional: The qualified, licensed person, firm or corporation who furnishes design and construction administration services required under the Agreement Documents. These services may include, but are not limited to: development of Construction Drawings and Documents, review of Contractor Submittal(s), review of and response to Requests for Information, approval and certification of progress payment applications, construction administration, and construction agreement close out.

Differing Site Conditions: Concealed or latent physical conditions or subsurface conditions at the Site that, (i) materially differ from the conditions indicated in the Agreement Documents, or (ii) are of an unusual nature, differing materially from the conditions ordinarily encountered and generally recognized as inherent in the Work at the general area of the Site. Caliche, rock, hard-digging or sandy/silty soil encountered on a project is not considered a "Differing Site Condition."

Drawings (Plans): Documents, which visually represent the scope, extent and character of the Work to be furnished and performed by Contractor during the construction phase and which have been prepared

or approved by the Design Professional and City. These documents include Drawings that have reached a sufficient state of completion and released by Design Professional solely for the purposes of review and use in performing constructability or bid-ability reviews by Contractor and in preparing cost estimates (e.g. Master Planning and Programming, Schematic Design, Design Development, and Construction Drawings), but *“not for construction.”* Shop Drawings are not Drawings as so defined.

Final Acceptance: The City's acceptance of the facility or project from the Contractor after all Work is completed, tested, and inspected in accordance with the Agreement requirements. Final Acceptance results in a Letter of Acceptance (LOA).

Fixed Price: A fixed price or amount for an Agreement Price, Scope of Work, materials, or other item under an Agreement, Change Order, or other agreement, which City agrees, in writing, to pay instead of the actual cost.

Float: The number of Days by which an activity can be delayed without lengthening the Critical Path and extending the Agreement Time. Unless otherwise expressly agreed in writing, all Float belongs to City.

Laws, Regulations, or Legal Requirements: Any and all applicable laws, rules, regulations, ordinances, codes and orders applicable to the Project of any and all governmental bodies, agencies, authorities and courts having jurisdiction and any applicable provisions of the Development Agreement for the Project (if any), including, without limitation, those provisions relating to the design and construction of the Project.

Line Item: The individual elements of Work identified on a bid or other schedule and associated with a price or a unit price and quantity particular to that individual element of the Work. Also refers to individual items of work within the Schedule of Values.

Liquidated Damages: Designated damages for the City to collect as compensation upon a specific breach (example: late delivery).

Long-Lead Item: Long-lead item refers to the equipment, product, or system that is identified at the earliest stage of a project to have a delivery time long enough to affect directly the Critical Path/the overall lead time of the project.

MAG: The Maricopa Association of Governments.

MAG Specifications: The most current version of the Uniform Standard Specifications for Public Works Construction published by MAG.

MAG Standard Details: The most current version of the Uniform Standard Details as published by MAG.

Minor change: A change in the Work having no impact on cost or time or the City-approved design intent, as determined by City.

Notice to Proceed (NTP): A written notice given by City to Contractor fixing the date on which Contractor will start to perform Contractor's obligations under the Agreement.

Project: The Project specified in the Agreement (including a Job Order).

Project Manager: The Project Manager designated in Article 1 of the Agreement, or any successor thereto

designated by City. The Project Manager has the authority to act on behalf of City, as delineated and limited by the Agreement Documents and applicable law. And City will communicate with Contractor through the Project Manager. However, the Project Manager has no authority to bind City or City Council in contravention of any City code, State or Federal statute or regulation, or these General Conditions.

Project Schedule: The schedule for the completion of the Project agreed to and required by City.

Project Specific Conditions: Additional conditions which apply to the specific Project and Scope of Work which are set forth in Exhibit D of the Agreement.

Project Team: The Project Team consisting of the Design Professional, Contractor, Project Manager, and such others as City may designate.

Punch List: The list initially prepared by Contractor pursuant to the Agreement Documents, reviewed and supplemented by the Project Manager (and at the sole option of the Project Manager, the Design Professional) and approved by City containing items of incomplete work not impacting Substantial Completion, if allowed for under the Agreement, and to be completed or corrected by Contractor after Substantial Completion and before Final Acceptance in accordance with the Agreement Documents.

Quality Assurance (QA) Testing: Testing performed to verify the accuracy and applicability of the QC testing results and to ascertain that the materials installed meet the specified levels of quality in accordance with the Agreement Documents.

Quality Control (QC) Testing: Testing performed to assure that the materials installed comply with the requirements in the Agreement Documents.

Requests for Information (RFIs): Formal written request from Contractor to City or Design Professional for the Project seeking clarification or additional information needed for Contractor to properly complete the Work or Services under the Agreement. City may require RFI's to be submitted on a specific form or in a specified format.

Schedule of Values (SOV): The specified document prepared by Contractor, and approved and accepted by City, which divides the Agreement Price into pay items, such that the sum of all pay items equals the Agreement Price for the construction phase Work, or for any portion of the Work having a separate specified Agreement Price.

Scope of Work: The scope of work agreed to or required by City and incorporated into the Agreement as Exhibit A.

Shop Drawings: All drawings, diagrams, schedules and other data specifically prepared for the Work by Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

Site: The land or premises on which the Project is located.

Specifications: The part(s) of the Agreement Documents for the construction phase consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto. Where specified, the Project must be constructed using the current Uniform Standard Specifications and Details for Public Works

Construction as furnished by the Maricopa Association of Governments, as amended by City.

Subconsultant: A person, firm or corporation having an Agreement with Consultant/Contractor to furnish services required as its independent professional associate or consultant with respect to the Project.

Subcontractor: An individual or firm having a direct Agreement with Contractor or any other individual or firm having an Agreement with the aforesaid contractors at any tier, who undertakes to perform a part of pre-construction services or construction phase Work at the Site for which Contractor is responsible. Subcontractors must be selected through the Subcontractor selection process described in the Agreement Documents, if any.

Substantial Completion: The date when the City determines that the Work (or separable units of Phases as provided in the Agreement Documents) is essentially and satisfactorily complete in accordance with the Agreement Documents such that the Project is ready for use by the City for its intended purpose, opening to the general public, full occupancy or use by City (including, without limitation, all separate units, or rooms, facilities, access, income-generating areas, and all areas serving the general public, as applicable, must be ready for full operation without material inconvenience or discomfort), including, to the extent applicable to the Work, the following: all materials, equipment, systems, controls, features, facilities, accessories, and similar elements are installed in the proper manner and in operating condition, inspected, and approved; surfaces have been painted; masonry and concrete cleaned with any sealer or other finish applied; utilities and systems connected and functioning; site work complete; permanent heating, ventilation, air conditioning, vertical transportation, and other systems properly operating with proper controls; lighting and electrical systems installed, operable and controlled; paving completed, signage installed, and other work as applicable, has been performed to a similar state of essential and satisfactory completion.

Supplier: A manufacturer, fabricator, distributor, or vendor having a direct Agreement with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the construction phase Work by Contractor or any Subcontractor.

Total Float: Number of Days by which pre-construction services or construction phase Work or any part of the same may be delayed without necessarily extending a pertinent Agreement Time or schedule milestone in the Project Schedule.

Work: The entire completion of construction or the various separately identifiable parts thereof, required to be furnished during the construction phase. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials, resources and equipment into the construction, and performing or furnishing services and documents as required by the Agreement Documents for the construction phase.

Writing: Typing, printing, photography and other modes of representing or reproducing words in a visible form, including email, and expressions.

### **SECTION 3 - STANDARD SPECIFICATIONS AND DETAILS**

- 3.1 City operates under the latest revision of the MAG Specifications and MAG Standard Details as amended by City. City's current amendment to the MAG Specifications, part of the City's Unified Development Manual, may be found and downloaded from City's website at <http://www.chandleraz.gov>.

- 3.2 Copies of the MAG Specifications and MAG Standard Details are available at the Maricopa Association of Governments office, 302 N. 1<sup>st</sup> Avenue, Suite 300, Phoenix, Arizona. They may also be downloaded from their website at: <http://www.azmag.gov/Newsroom/Publications>
- 3.3 The MAG Specifications and Standard Details and City's amendments thereto are incorporated into the Agreement by this reference.

#### **SECTION 4 - CONTRACTOR'S RESPONSIBILITIES FOR CONSTRUCTION SERVICES**

##### **4.1 GENERAL**

- 4.1.1 Contractor must construct the Work in accordance with the Agreement Documents and as outlined in Exhibit A of the Agreement to the satisfaction of City, exercising the degree of professional care, skill, diligence, quality and judgment that a professional construction manager engaged, experienced and specializing in the construction management of construction and facilities of similar scope, function, size, quality, complexity and detail in urban areas throughout the United States comparable to Chandler, Arizona would exercise at such time, under similar conditions. Contractor must, at all times, perform the Work in conformance with sound and generally accepted engineering principles and construction management and construction contracting practices.
- 4.1.2 If Contractor observes errors, discrepancies or omissions in the Agreement Documents, Contractor must promptly notify the Design Professional and City and request clarification. If Contractor, with the exercise of reasonable care, should have recognized such error, inconsistency, omission, or difference and fails to report it to City, and if Contractor proceeds with the Work affected by such observed errors, discrepancies or omissions, without receiving such clarifications, Contractor does so at its own risk and will be liable to City for damages resulting from proceeding without clarification.
- 4.1.3 Project Team and agents of each of them, testing agencies and governmental agencies with jurisdictional interests will be provided access to the Work at reasonable times for their observation, inspection, and testing. Contractor must provide proper and safe conditions for such access.
- 4.1.4 Contractor must comply with, and require all Subcontractors to comply with, the Arizona Contractors' license laws, including all requirements with respect to being duly registered and licensed.
- 4.1.5 Contractor must ensure that all employees performing any Work for which Contractor is responsible have a legal right to live and work in the United States. In addition, all compensation of any such employee must meet all applicable requirements of the Fair Labor Standards Act (FLSA) and Federal Minimum Wage laws.
- 4.1.6 Contractor must comply with the Immigration Reform and Control Act of 1986 (IRCA). Contractor understands and acknowledges the applicability of the IRCA activities. Contractor agrees to comply with the IRCA while performing their work and to permit City inspection of Contractor personnel records to verify such compliance.
- 4.1.7 Pursuant to MAG Specifications §§ 107.4, Contractor must report immediately any discovery of archeological ruins or artifacts. Excavation must stop immediately so that City can decide on the pertinent steps to follow such discovery.



- 4.1.8 All property owners that may be affected by the proposed construction activities must be notified of the scope, duration of the construction activities and possible interference with their day-to-day activities by Contractor prior to start of construction. In addition, individual residential or commercial interferences, such as driveway restrictions, water outages, and all other Work adjacent to residence/business, require 48-hour notification in advance of specific adjoining Work. Notification may be through door hangers or other procedures approved by the City.
- 4.1.9 Access must be maintained to adjacent properties at all times during construction. Where property has more than one point of access, no more than one access will be restricted or closed at any one time. Access to adjacent private driveways will be maintained during all non-working hours.
- 4.1.10 Contractor must furnish and erect construction signs in accordance with Project Specifications. The signs must be professionally prepared and subject to approval by City, must be maintained by Contractor for the duration of the project, and must be removed by Contractor during the final project clean up.
- 4.1.11 The number of signs required, the size, shape, installation requirements and information to be included for construction signs is established on the detail sheet, provided, however, signs must be a minimum of 4 foot by 8 foot and must be installed so that the bottom of the sign is at least 4 foot above grade. No direct payment will be made for furnishing and erecting construction signs. The cost thereof must be included in other items for which direct payment is made. Sign locations will be determined by City.
- 4.1.12 All required construction signs must be installed by Contractor within 7 Days of Notice to Proceed.
- 4.1.13 The Work to be accomplished under these Agreement Documents has been designed for City by a Design Professional retained by City for this purpose. It is understood that normal construction Administration for the purpose of interpretation of the Agreement Documents is provided by City. Should any services of the Design Professional be required to assist in the corrections of errors or omissions by Contractor, or services of the Design Professional be required because of changes in structure or equipment where Contractor has requested approval of substitute methods or material, or any other items detailed herein below, those services will be provided by the Design Professional at the standard hourly rates previously negotiated with City and must be paid for by the Contractor.
- 4.1.14 Contractor must reimburse City for costs incurred by the Design Professional for additional services to the Project through no fault of City or the Design Professional including, but not limited to, the following conditions:
- a. Additional Site visits, investigations, inspections, design work or reports by the Design Professional which are required due to damages to existing facilities or completed Work caused by the Contractor in his performance, Contractor's negligence, or Contractor's Work which is rejected as defective or as failing to conform to the Agreement Documents;
  - b. Design Professional construction phase services rendered on the project during the time the project remains incomplete after the Agreement date of final completion will be charged to Contractor at a rate previously negotiated City; and

- c. All retesting required due to the failure of Contractor's Work to meet the requirements of the Agreement Documents will be at Contractor's expense. All standby and travel time by the City's testing lab, the Design Professional or City due to Contractor's inability to be prepared for testing at the agreed upon time will be at the Contractor's expense.

4.1.15 City may withhold from any payment otherwise due to Contractor any amounts necessary to pay the Design Professional for such additional services as provided herein above.

4.1.16 Contractor will not be required to bear additional costs incurred by City due to errors by the Design Professional.

4.2 **CONTRACTOR'S PRE-AGREEMENT AND PRE-WORK DELIVERABLES**

4.2.1 Prior to award of the Agreement, Contractor must execute Agreement and deliver to City. Failure to do so may delay Agreement award. Contractor must also provide to City its Contractor's License classification and number and its Federal Tax I.D. number.

4.2.2 Before beginning any Work under the Agreement, Agreement must be fully executed by City.

4.2.3 After Agreement award, City will issue to Contractor an award letter. At that time Contractor must deliver to City such bonds and certificates of insurance with endorsements in such amounts (and other evidence of insurance requested by City) required under Section 11 of these General Conditions, and as the Agreement requires.

4.2.4 As evidence of Workmen's Compensation Insurance, Contractor must, upon request, provide a letter of certification from the Industrial Commission of Arizona that Contractor is insured by the State Compensation Fund or is an authorized self-insurer or a certificate of insurance issued by an insurance company authorized by the Insurance Department of Arizona to write Workmen's Compensation and Occupational Disease Insurance in the State of Arizona.

4.2.5 Within 10 Days of the date of the executed Agreement letter issued by City, Contractor must submit to City for review and acceptance the following items:

4.2.5.1 Comprehensive construction Project Schedule including a Critical Path Method (CPM) diagram schedule as described in Section 6.2. Project Schedule must be in Microsoft Project standard file format. Within 10 Days of receipt of City's comments, Contractor must make all required corrections, adjustments, and additions to complete the Project Schedule and resubmit to City for review.

4.2.5.2 Preliminary schedule of submittals and Shop Drawings. Within 10 Days of receipt of City's comments, Contractor must submit the corrected and completed schedule of Shop Drawings submissions for approval. Contractor's schedule of Shop Drawings and sample submittals will be acceptable to City if it provides a workable arrangement for reviewing and processing the required submittals.

4.2.5.3 Schedule of Values in a form specified by City reflecting the subcontracts and other categories that will be used to submit Pay Applications for the Work. The total amount of the Schedule of Values must not be greater than the Agreement Price. The Schedule of Values will be reviewed at the Pre-Construction Conference and revised by Contractor within 10 Days after Pre-Construction Conference in response to comments and questions from

City. Once accepted by City in writing, the Schedule of Values for the Project must not be changed without the prior written approval of City.

4.2.6 Video Recording Requirement. Prior to performing any Work, Contractor must document the existing conditions of the Site, all other areas where Work will occur and all adjacent areas that may be impacted by the Work via digital video format. Contractor must video record and index all areas, features, buildings and other public and private improvements that could potentially be impacted by the Work. Video recording must be coordinated with City. When video recording private property, Contractor must also coordinate the video recording with the private property owner, if possible. Contractor must provide City with a copy of said digital video format prior to performing any Work.

4.2.7 Aerial Drone Construction Photography.

4.2.7.1 If Agreement duration is greater than 90 calendar days, Contractor must engage a professional unmanned aerial vehicle (UAV) aerial pilot to photograph the Site prior to construction mobilization, at three-month intervals during construction, and following final inspection. Drone camera specifications must meet the following minimum requirements:

- a. 1-inch CMOS
- b. Pixels: 20M
- c. FOV 84 8.8 mm/24 mm (35 mm format equivalent) f/2.8-f/11 auto focus at 1 m-
- d. For photographing: 16.9 Aspect Ratio: 5472x3078
- e. For video shooting: MP4/MOV/H.264
- f. FHD: 1920x1080 120p @100Mbps
- g. File format: High Definition (HD) JPEG for digital photos and HD MPEG 4 for digital video.
- h. All metadata to be recorded including GPS data and preserved with photographs provided.

Interval	JPEG
3 month intervals	At an altitude (AGL) between 70-90 ft.
3 month intervals	Images to be taken every 50-100 ft. to be determined based on project scope.

4.2.7.2 Drone photos to be taken in sequential geographical order and then organized and provided in the same manner unless otherwise specified.

4.2.7.3 Photos to be provided digitally via an online file share service and/or by a USB drive to contractor.

4.2.7.4 Drone pilots to obey ALL local (city, county, state) UAV regulations as well as FAA UAV guidelines including, but not limited to, conducting all flights during daylight hours, not exceeding maximum altitude ceilings (depending on area), not flying over people, yielding to other aircraft.

4.2.7.5 Drone pilots must fly drone within visual line of sight (VSOL) and have visual spotter when needed. Drone pilots only to operate in favorable weather conditions when minimum visibility is 3 miles or greater.

4.2.7.6 Drone pilots to conduct a preflight checklist and visually inspect the entire flight path prior to flying to ensure a safe flight.

4.2.7.7      **Airspace Authorizations.** Operations in Class G airspace are allowed without air traffic control (ATC) permission. Operations in Class B, C, D and E airspace need ATC authorization. Drone pilots to schedule each flight in advance and based on airspace if required will notify nearby airports/control towers, etc.

4.2.8      **Government Approvals and Permits.**

4.2.8.1      Contractor must obtain all necessary permits for the Work and pay all applicable fees, unless otherwise noted on the Plans and in the Specifications. City permit fees will be paid internally by City. For bidding purposes, an allowance for all permit fees is included in the bid schedule under the item "allowance for permit fees." The Contractor will be paid for the actual cost of the permit fees upon submitting a receipt showing the fee Contractor has paid. Excluded from the above allowance are items such as all costs incurred by the Contractor in securing the permit except for the actual permit fee established by the agency, cost for all shutdowns or outages, cost for pole bracing, cost of permits for construction water, cost of construction water, cost for any additional insurance requirements, cost for any licenses, and other similar type costs. Contractor is specifically notified of the need to obtain the necessary environmental permits or file the necessary environmental and regulatory permit notices.

4.2.8.2      Copies of all permits and the associated notices must be provided to City prior to starting the permitted activity.

4.3      **PRE-CONSTRUCTION CONFERENCE**

4.3.1      Prior to the commencement of any Work, City will schedule a Pre-Construction Conference.

4.3.2      The purpose of this Conference is to establish a working relationship between Contractor, the utility firms, and various City agencies. The agenda will include critical elements of the Work schedule, submittal schedule, cost breakdown of major lump sum items, Payment Requests and processing, coordination with the involved utility firms, and emergency telephone numbers for all representatives involved in the course of construction.

4.3.3      Minimum attendance by Contractor at any mandatory meeting with City must be (1) Contractor's Representative, who is authorized to execute and sign documents on behalf of the firm, (2) Contractor's on-site Superintendent, and (3) Contractor's Safety Office, or other employee responsible for safety.

4.4      **PERFORMANCE OF THE WORK (INCLUDING FIELD MEASUREMENTS, SUBCONTRACTORS, AND SUPPLIERS)**

4.4.1      Unless otherwise provided in the Agreement Documents to be the responsibility of City or a separate Contractor, Contractor must provide through itself or Subcontractors the necessary supervision, labor, inspection, testing, start-up, material, equipment, machinery, temporary utilities and other temporary facilities to permit Contractor to complete the Work consistent with the Agreement Documents.

4.4.2      Contractor must perform all construction activities efficiently and with the requisite expertise, skill and competence to satisfy the requirements of the Agreement Documents. Contractor must at all times exercise complete and exclusive control over the means, methods, safety, sequences and techniques of construction.

4.4.3      Contractor's Superintendent must be present at the Site at all times that material Work

under this Agreement is taking place. Contractor's Superintendent or designee must be present at the Site at all times any other Work under this Agreement is taking place. Superintendent must not be replaced without written notice to City. Whenever the Superintendent is not present at a particular part of the Work where the City or Design Professional may desire to inform the Contractor relative to interpretation of the Drawings and Specifications or to disapproval or rejection of materials or Work performed, the City or Design Professional may provide such information in writing to the foreman or other worker in charge of the particular part of the Work in reference to which the information is given. Information so given will be as binding as if given to the Superintendent.

4.4.4 All elements of the Work must be under the direct supervision of a foreman or his designated representative on the Site who must have the authority to take actions required to properly carry out that particular element of the Work.

4.4.5 Working Hours. Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise indicated, all Work at the Site must be performed during regular working hours, and Contractor will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without City's written consent given after prior written notice to City. If it will become absolutely necessary to perform Work at night or on Saturdays, Sundays or legal holidays, the City must be informed at least 24 hours in advance of the beginning of performance of such Work. Only such Work will be done at night as can be done satisfactorily as determined by the City. Good lighting and all other necessary facilities for carrying out and inspecting the Work must be provided and maintained at all points where such Work is being done. Further, unless such non-normal work hours are performed at City's request or required by the Agreement Documents, Contractor must pay to City all additional costs incurred by City by reason of such non-normal working hours. Expenses incurred by City for overtime compensation must be reimbursed by Contractor as follows: (i) City staff at the rate set forth in current City Fee Schedule as published on City website, (ii) Design Professional and staff at the standard hourly rates previously negotiated with City, and (iii) all others at actual cost plus ten percent administrative overhead. Such costs may be deducted by City from any payments due to Contractor. Provided, however, if overtime work or work during other than normal hours is at the request of City and not due to Contractor delay, City will pay the cost of City overtime expenses.

4.4.6 Where the Agreement Documents require that a particular product be installed or applied by an applicator approved by the manufacturer, it is Contractor's responsibility to ensure the Subcontractor employed for such work is approved by the manufacturer. All materials and equipment must be stored, applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier or distributor, except as otherwise provided in the Agreement Documents; but no provisions of any such instructions will be effective to impose on City or Design Professional responsibility for the means, methods, techniques, sequences or procedures of construction or for safety precautions incident thereto.

4.4.7 Before starting the Work, Contractor must carefully study and compare the various Plans, Drawings, other Agreement Documents, and Specifications relative to that portion of the Work, as well as the information furnished by City, must take field measurements of any existing conditions related to that portion of the Work and must observe any conditions at the Site affecting it. The exactness of grades, elevations, dimensions, or locations given on any Drawings, or the Work installed by other contractors, is not guaranteed by City.

- 4.4.8 Before ordering materials or doing Work, Contractor and each Subcontractor must verify measurements at the Site and will be responsible for the correctness of such measurements. No extra charge or compensation will be allowed because of differences between actual dimensions and the dimensions indicated on the Agreement Documents, including the Drawings.
- 4.4.9 Ground Level Construction Photography.
- 4.4.9.1 The Contractor must furnish progress photographs of the project. The photographer selected by the Contractor must be approved by the City and must be either a commercial photographer or an individual experienced and equipped for such photography.
- 4.4.9.2 The Contractor must deliver to City all photographs taken during that period with each application for payment. If the current photographs do not accompany the application, the application will not be reviewed and will be returned to the Contractor as incomplete.
- 4.4.9.3 Photographs must be identified by use of typewritten labels affixed to the back of the photograph. The label must provide a description of the view, the direction from which the photograph was taken, the name of the project, City's project number, the name of Contractor and the date of the photography. The stationing must also be included for all pipeline installations.
- 4.4.9.4 Photographs must be taken during the construction period and must be of aesthetic composition and depict the progress of the Work from the beginning of construction through and including the finished product. City may vary the specified frequency so that significant progress or changes can be recorded on the photographs.
- 4.4.10 Underground Facilities.
- 4.4.10.1 The existence and number of facilities as shown on the Plans are estimated from information furnished by the particular utility. Contractor is responsible for field verification and location of all utilities prior to the start of construction. No field work will be allowed to start until Contractor has contacted Arizona 811 and all affected utilities have been located. In addition, Contractor must expose and physically locate all potentially conflicting utilities prior to construction. The actual locations of the utilities must be compared to locations shown on the Plans and any required changes in alignment and grade must be made at the time of construction in consultation with Project Manager. It is generally recognized and Contractor should anticipate that information from Arizona 811 or information from utility companies during project design, frequently fails to disclose all underground facilities. The fact that more utility lines or other underground facilities are located in the Project Site than shown on the Project Plans does not constitute an "unforeseen Condition" and such undisclosed underground facilities do not differ materially from the conditions which Contractor should expect. The provisions of Sections 105.4, 105.6, 107.11 and 109.8.1 of the MAG Uniform Standard Specifications for Public Works Construction apply and are incorporated herein by this reference.
- 4.4.10.2 Contractor is responsible for all coordination with utility companies. The provisions of Sections 105.4, 105.6, 107.11 and 109.8.1 of the MAG Uniform Standard Specifications for Public Works Construction strictly apply and no additional compensation will be paid to Contractor for delays due to utility work on the project.
- 4.4.11 Relocation of Existing Water Meters. When a service line has been extended and a line

setter installed in a meter box, City forces will re-install meter. No compression fittings will be utilized.

4.4.12 Water Turn-On or Turn-Off.

4.4.12.1 Contractor must coordinate all water line turn-ons and turn-offs through the City. Application must be made to the Municipal Utility Division and Contractor must pay the established charges. The City will close existing valves, but will not guarantee a bone-dry Shutdown.

4.4.12.2 Contractor must notify all customers affected by the turn-off not less than 48 hours in advance. Notification must be in writing, must give the reason for the turn-off and must give the estimated time and duration that water service will be interrupted. Contractor is also notified that water turn-off will not be permitted on the Day before and after Thanksgiving Day and Christmas Day.

4.4.12.3 No direct payment will be made to Contractor for turn-ons or turn-offs. Costs associated therewith will be included in other items for which direct payment is made.

4.4.13 Tests and Inspections.

4.4.13.1 Contractor must give City timely (at a minimum, twenty-four hours) notice of readiness of the Work for all required inspections, tests or approvals. Contractor must give timely notice to City in advance of backfilling or otherwise covering any part of the Work so that city representative may, if desired, observe such part of the Work before it is concealed. Whenever Contractor varies the normal period during which Work or any portion of it is carried on each Day, Contractor must give timely notice to City so that city representative may, if desired, be present to observe the Work in progress. If Contractor fails to give such timely notice, any Work done in the absence of city representative will be subject to rejection. If Contractor gives such notice to City, but then is not ready for such inspections, tests, approvals or observations at the time so noticed, Contractor must reimburse City for all costs incurred by the attendance of city representatives.

4.4.13.2 If any law, ordinance, rule, regulation, code, or orders of any public body having jurisdiction requires any Work (or part thereof) to be inspected, tested or approved, Contractor (unless another party is specified in the Agreement Documents) must assume full responsibility therefor, pay all costs in connection therewith and furnish City the required certificates of inspection, testing, or approval. Contractor must also be responsible for and must pay all costs in connection with any inspection or testing required by the Specifications in connection with City's acceptance of a manufacturer, fabricator, supplier or distributor of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. The cost of all other inspections, tests and approvals required by the Agreement Documents will be paid by City (unless otherwise specified).

4.4.13.3 All inspections, tests or approvals other than those required by law, ordinance, rule, regulation, code or order of any public body having jurisdiction must be performed by organizations acceptable to City and by the Design Professional if so specified.

4.4.13.4 Neither observations by City, the Design Professional nor inspections, tests or approvals by others will relieve Contractor from their obligations to perform the Work in accordance with the Agreement Documents.

- 4.4.14 Uncovering Work. If any Work that is to be observed, inspected, tested or approved is covered without written concurrence of City, it must, if requested by City be uncovered for observation. Unless Contractor has given City timely notice of Contractor's intention to cover such Work and City has not acted with reasonable promptness in response to such notice, Contractor must furnish all necessary labor, material and bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, including compensation for additional professional services, and an appropriate deductive Change Order will be issued.
- 4.4.15 In all cases of interconnection of its Work with existing or other Work, Contractor must verify at the Site all dimensions relating to such existing or other Work. Any errors due to Contractor's failure to so verify all such grades, elevations, locations or dimensions must be promptly rectified by Contractor without any increase in the Agreement Price. Any design errors or omissions noted by Contractor during this review must be reported promptly to City.
- 4.4.16 Contractor must establish and maintain all construction grades, lines, levels, and benchmarks, and will be responsible for accuracy and protection of same. This Work must be performed or supervised by a licensed civil engineer or surveyor in the State of Arizona.
- 4.4.17 Contractor must photograph all buried piping of greater than four (4) inches in diameter prior to backfill.
- 4.4.18 Contractor is responsible for the proper performance of the work of Subcontractors and any acts and omissions in connection with such performance. Nothing in the Agreement Documents is intended or deemed to create any legal or contractual relationship between City and any Subcontractor or Sub-Subcontractor, including but not limited to any third-party beneficiary rights.
- 4.4.19 Contractor must coordinate the activities of all Subcontractors. Contractor must coordinate performance of the Work with City's Public Works & Utilities Department and other departments or agencies within City. The Design Professional and other contractors or parties involved in the Project. If City performs other work on the Project or at the Site with separate contractors under City's control, Contractor agrees to cooperate and coordinate its activities with those of such separate contractors so that the Project can be completed in an orderly and coordinated manner without unreasonable disruption.
- 4.4.20 Contractor will not substitute or change any Subcontractor or Supplier without the prior written approval of City. Any substitute or replacement Subcontractor or Supplier must be required to meet the same qualifications and selection criteria and process as the original Subcontractor or Supplier. If a Subcontract/Supplier selection plan has been approved by City, Contractor will follow that plan unless otherwise approved by City in writing.
- 4.4.21 Contractor must not change or replace any members of its Project team, including Contractor's Representative, Project Manager, or Superintendent, without an explanation for the change being given to City, and receiving prior written approval of the change from City, which approval will not be unreasonably withheld.
- 4.4.22 Subcontractors whose scope of work has a value greater than 15% of the total Agreement Price are required to furnish performance and payment bonds to Contractor, unless



otherwise approved in writing by City.

- 4.4.23 Contractor must comply with MAG Specification § 108.2 (E) unless otherwise specified in Agreement Documents.

4.5 **CONTROL OF THE PROJECT SITE**

- 4.5.1 Throughout all phases of construction, including suspension of Work, Contractor must keep the Site reasonably free from debris, trash and construction wastes to permit Contractor to perform its construction services efficiently, safely and without interfering with the use of adjacent land areas. Prior to Final Acceptance of the Work, or a portion of the Work, Contractor must remove all debris, trash, construction wastes, materials, equipment, machinery and tools arising from the Work or applicable portions thereof to permit City to occupy the Project or a portion of the Project for its intended use.
- 4.5.2 Contractor must take whatever steps, procedures or means necessary to prevent dust nuisance due to construction operations. The dust control measures must be maintained at all times to the satisfaction of City and in accordance with the requirements of the Maricopa County Bureau of Air Pollution Control Rules and Regulations.
- 4.5.3 Contractor must maintain Americans with Disabilities Act (ADA) and American National Standards Institute (ANSI) accessibility requirements during construction activities, including without limitation compliance with the 2010 regulations governing implementation of the ADA to the extent applicable. ADA and ANSI accessibility requirements must include, but not be limited to, parking, building access, areas of refuge, and emergency exit paths of travel. Contractor is responsible for the coordination of all Work to minimize disruption to residents and the public.
- 4.5.4 Only materials and equipment used directly in the Work will be brought to and stored on the Site by Contractor. When equipment is no longer required for Work, it must be removed promptly from the Site. Protection of construction materials and equipment stored at the Site from weather, theft, damage and all other adversity is solely the responsibility of the Contractor.
- 4.5.5 Contractor agrees all persons working on the Site must act at all times in the best interest of the Project and will comply with all applicable rules and regulations reasonably set forth by City related to the Site. Notwithstanding the foregoing or anything in this Agreement to the contrary, City may remove from the Site any individual who City deems in their reasonable discretion to be creating a disturbance or causing any problem on the Site.
- 4.5.6 Contractor will be responsible to City for the acts and omissions of Contractor's employees, Subcontractors and their agents and employees, and any other person performing any of the Work under an Agreement with Contractor, or claiming by, through or under Contractor, for all damages, losses, costs and expenses resulting from such acts or omissions.
- 4.5.7 City may conduct criminal, drive history, and all other requested background checks of Contractor and Subcontractor personnel performing Work or who have access to City's information, data, or facilities in accordance with City's current background check policies, or the provisions of the Project Specific Conditions. Any officer, employee or agent that fails to background check must be replaced immediately.
- 4.5.8 City will have a final authority, based upon security reasons: (i) to determine when

security clearance of Contractor's and Subcontractor's personnel is required; (ii) to determine the nature of the security clearance, up to and including fingerprinting personnel; and (iii) to determine whether or not any individual or entity may provide Services or perform Work under the Agreement.

- 4.5.9 If City objects to any personnel for any reasonable cause, then Contractor must, upon notice from City, remove such individual from the Project.

4.6 **PROJECT SAFETY**

- 4.6.1 The Project and all Work performed in relation thereto is governed by applicable provisions of the federal laws, including but not limited to, the latest amendments of the following:

- a. Williams-Steiger Occupational Safety & Health Act of 1970, Public Law, 91-596.
- b. Part 1910 and Part 1926 – Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations.
- c. Part 1518 – Safety and Health Regulations for Construction, Chapter XIII of Title 29, Code of Federal Regulations.

- 4.6.2 Contractor is responsible for safety of the job Site for employees of Contractor as well as for members of the general public and others who may drive or walk through or be at the Site.

- 4.6.3 Contractor recognizes the importance of performing the Work in a safe manner so as to prevent damage, injury or loss to: (i) all individuals at the Site, whether working or visiting; (ii) the Work, including materials and equipment incorporated into the Work and stored On-Site or Off-Site; and (iii) all other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction; and (iv) the owners or tenants of adjacent property and their patrons, employees and invitees.

- 4.6.4 Contractor assumes responsibility for implementing and monitoring all safety precautions and programs related to the performance of the Work.

- 4.6.5 Contractor must provide a "competent person" as required by O.S.H.A regulations. The "competent person" must be identified at the Pre-Construction Conference with City advised in writing of any changes.

- 4.6.6 The "competent person" must make routine daily inspections of the Site and must hold weekly safety meetings with Contractor's personnel, Subcontractors and others as applicable.

- 4.6.7 Contractor and Subcontractors must comply with all legal and regulatory requirements relating to safety, as well as any City specific safety requirements set forth in the Agreement Documents, provided that such City-specific requirements do not violate any applicable legal and regulatory requirements.

- 4.6.8 Contractor will immediately report in writing any safety-related injury, loss, damage or accident arising from the Work to Project Manager and, to the extent mandated by Legal Requirements, to all government or quasi-government authorities having jurisdiction over safety-related matters involving the Project or the Work.

- 4.6.9 Contractor's responsibility for safety under this Section is not intended in any way to relieve Subcontractors and Sub-Subcontractors of their own contractual and legal obligations and responsibility for (i) complying with all Legal Requirements, including those related to health and safety matters, and (ii) taking all necessary measures to implement and monitor all safety precautions and programs to guard against injury, losses, damages or accidents resulting from their performance of the Work.
- 4.6.10 As between City and Contractor, Contractor is responsible to City for any and all the safety issues relating to the Work on the Project. Contractor must administer and manage the safety program. This will include, but not necessarily be limited to review of the safety programs of each Subcontractor. Contractor must monitor the establishment and execution of compliance with all applicable regulatory and advisory agency construction safety standards. Contractor's responsibility for review, monitoring, and coordination of the Subcontractor's safety programs will not extend to direct control over execution of the Subcontractors' safety programs. Notwithstanding Contractor's safety obligations to City, it is agreed and understood that each individual Subcontractor will remain controlling employer responsible for the safety programs and precautions applicable to its own work and the activities of other's work in areas designated to be controlled by such Subcontractor for purposes of workers compensation insurance coverage.
- 4.6.11 Nothing in this agreement will relieve Contractor of his responsibility to maintain traffic, structures, etc., as noted on the Plans, Specifications, and Project Specific Conditions. Contractor is responsible to provide all necessary shoring, bracing and trench support as is necessary to maintain traffic structures, etc., as stipulated in the Plans, Specifications, and Special Provisions. If the stability of adjoining building, walls, roadways, etc., is endangered by Contractor's excavation, shoring, bracing, or under pinning must be provided as necessary to ensure project safety. Cost for shoring, bracing, underpinning, and trench support will be included in the appropriate items listed in the Agreement Price, and no additional payment will be made for this work.

4.7 **MATERIALS QUALITY, SUBSTITUTIONS, AND SHOP DRAWINGS**

4.7.1 **Quality Control and Quality Assurance Testing.**

- 4.7.1.1 All construction materials to be used or incorporated in the Project are subject to inspection, Quality Control & Quality Assurance Testing, and approval or rejection by City. Any material rejected by City must be removed immediately and replaced in an acceptable manner to City at no additional cost to City. When QC/QA tests indicate noncompliance with the Agreement Documents, retesting must be performed by the same testing laboratory that performed the tests that indicated noncompliance.
- 4.7.1.2 The Contractor must establish, provide, and maintain an effective Quality Control Testing Program (QCTP). The Contractor must develop his own program or procure the services of a consultant. In either case, the party performing the tests must be currently certified by the National Bureau of Standards in the National Voluntary Laboratory Accreditation Program (NVLAP) for construction services or the AASHTO Accreditation Plan (AAP) for Soils, Asphalt and Concrete. The Contractor must provide all support necessary to perform QC and QA testing and sampling (i.e. shoring for testing trench backfill, backhoes, motor graders, loaders, etc. to facilitate testing and sampling). The City will perform the QA testing.
- 4.7.1.3 The Contractor must submit a written QCTP to the City as a required submittal. The Contractor must not begin Work until the Quality Control Program has been reviewed and

- accepted by the City. Resumes of all personnel that will be associated directly or indirectly with the QCTP must be included.
- 4.7.1.4 The QCTP must include, but not be limited to, on-site/field and laboratory testing of all material delivered to the Site and any existing materials or conditions pertinent to the project.
- 4.7.1.5 All testing must be under the direction of a Professional Engineer registered in the State of Arizona, knowledgeable in Materials Testing. All "Test Report" forms must be stamped by said Engineer.
- 4.7.1.6 The written QCTP will set forth the responsibilities of the engineer, project manager, supervisory personnel and each technician assigned to this project. Substitutions or replacement of personnel must require prior written approval by the City. All personnel must be proficient within their assigned duties and possess certification(s) commensurate with their position and responsibilities. The minimum certification(s) for each technician must be NICET Level II, Arizona Technical Testing Institute, American Concrete Institute, or other nationally recognized program applicable to the project and approved by the City of Chandler. The written QCTP must include a description of the required field and construction materials laboratory tests, including required frequencies that meet the minimums established herein.
- 4.7.1.7 The Contractor must establish a system to record and report all material test results. The daily test reports must include, but not be limited to:
- a. Test designation;
  - b. Date of test;
  - c. Name of tester;
  - d. Location of test/sample (station and offset);
  - e. Product suppliers and product codes (as applicable);
  - f. Depth/elevation of test/sample;
  - g. Test result;
  - h. Control requirement(s);
  - i. Cause of rejection (if applicable);
  - j. Results of retests (if applicable); and
  - k. Remedial action (if applicable).
- 4.7.1.8 The Contractor must submit test results to the designated City representative.
- 4.7.1.9 The Contractor must also submit a weekly report to the City summarizing the testing and construction activities completed by emailing the report to the email addresses noted above. All weekly reports must be submitted simultaneously to the Contractor and the City of Chandler. The report must include individual summary sheets for each utility line, structure, and portion of the pavement section. Cores must be numbered sequentially throughout the Project. Re-cores must reference the original core by number and must contain the averaged values for thickness and density. Total pavement thickness must be reported. Vertical location of tests for underground utilities must indicate the depth of the

excavation at the location of the test (i.e., cut to flow line [if applicable], depth to bottom or top of pipe, etc.). Density tests must be numbered sequentially. If the minimum number of tests has not been performed per the written QCTP, this must be stated in the weekly summary report with an explanation of the circumstances.

4.7.1.10 The City will maintain a copy of the Project test results and weekly reports in the Project file. In cases where quality control activities do not comply with the Agreement provisions, the City may:

- a. Order the Contractor to replace ineffective or unqualified quality control personnel.
- b. Order the Contractor to stop operations until appropriate corrective action is taken.

4.7.1.11 Although minimum testing requirements are specified herein, the Contractor bears full responsibility for the quality of the materials and their installation and may elect to perform additional testing beyond the requirements set forth herein to ensure compliance.

4.7.1.12 The Quality Control requirements contained in this Section are in addition to and separate from Quality Assurance Testing, which will be performed by the City of Chandler or its representative. If the Quality Assurance test results are not in agreement with the Quality Control test results, the Contractor will have the option to retain a third party consultant for referee tests. The third party consultant must meet the same requirements as the consultant performing the Quality Control Testing. The results of the third party will be binding. All cost incurred by the referee testing will be the Contractor's expense. If the Contractor elects not to retain a third party for referee testing, the City of Chandler test results will prevail.

4.7.1.13 Except as otherwise noted within this Section, Work or materials required by this Section are non-pay items. Per MAG Section 101, a non-pay item is an item of Work for which no separate payment will be made, the cost of which is to be included as an incidental cost for associated item(s) included on the Bid Schedule or Schedule of Values.

#### 4.7.2 Trade Names and Substitutions.

4.7.2.1 Substitutions prior to bid will only be considered if in compliance with Arizona Revised Statute § 34-104.

4.7.2.2 Contractor, if requested by City, must submit Samples or any additional information that may be necessary to evaluate the acceptability of the substitution.

4.7.2.3 City will make the final decision and will notify Contractor in writing as to whether the substitution has been accepted or rejected.

4.7.2.4 If City does not respond within 15 working days, Contractor must continue to perform the Work in accordance with the Agreement Documents and the substitution will be considered rejected.

#### 4.7.3 Shop Drawings.

4.7.3.1 Contractor must prepare and submit Shop Drawings which show details of all Work to insure proper installation of the Work using those materials and equipment specified under the approved Plans and Specifications.

- 4.7.3.2 Contractor must submit a schedule of Shop Drawing submissions, which avoids bulk submissions to the extent reasonably possible, with the Project Schedule for City approval. The schedule of Shop Drawing submissions must include all of the items for which Shop Drawings are required by the Agreement Documents, including the Specifications. Unless otherwise noted, Shop Drawings will not be required for items specified or detailed in the Uniform Standard Specifications and Details or the Technical Specifications.
- 4.7.3.3 Shop Drawings must be numbered consecutively for each Specification section and must accurately and distinctly present the following:
- a. All working and erection dimensions.
  - b. Arrangements and sectional views.
  - c. Necessary details, including complete information for making connections between work under this Agreement and work under other Agreements.
  - d. Kinds of materials and finishes.
  - e. Parts list and description thereof.
- 4.7.3.4 Each Drawing or page must include:
- a. Project Name, City of Chandler Project Number and descriptions.
  - b. Submittal date and space for revision dates.
  - c. Identification of equipment, product or material.
  - d. Name of Contractor and Subcontractor.
  - e. Name of Supplier and Manufacturer.
  - f. Relation to adjacent structure of material.
  - g. Physical dimensions clearly identified.
  - h. ASTM and Federal Specifications references.
  - i. Identification of and justification for deviations from the Agreement Documents.
  - j. Contractor's stamp, initialed or signed, dated and certifying the review of submittal, certification of field measurements and compliance with Agreement.
  - k. Location at which the equipment or materials are to be installed.
- 4.7.3.5 Location will mean both physical location and location relative to other connected or attached material. City will return unchecked any submittal, which does not contain complete data on the Work and full information on related matters.
- 4.7.3.6 Stock or standard drawings will not be accepted for review unless full identification and supplementary information is shown thereon in ink or typewritten form.
- 4.7.3.7 Contractor must schedule, prepare and submit all Shop Drawings in accordance with a timetable that will allow its suppliers and manufacturers sufficient time to fabricate, manufacture, inspect, test and deliver their respective products to the project Site in a timely manner so as to not delay the complete performance of the Work.

- 4.7.3.8 If the Shop Drawings show departures from the Agreement requirements, Contractor must make specific mention thereof in the Letter of Transmittal; otherwise review of such submittals by City will not constitute review of the departure. Review of the Drawings will constitute review of the specific subject matter for which the Drawings were submitted and not of any other structure, material, equipment, or apparatus shown on the Drawings.
- 4.7.3.9 The review of Shop Drawings will be general and will not relieve Contractor of responsibility for the accuracy of such Drawings, nor for the proper fitting and construction of the Work, nor for the furnishing of materials or Work required by the Agreement. No construction called for by Shop Drawings will be initiated until such Drawings have been reviewed and approved by City.
- 4.7.3.10 The procedure in seeking review of the Shop Drawings will be as follows:
- a. Contractor must submit complete sets of Shop Drawings and other descriptive data as specified in this Section.
  - b. After Contractor's submittal or resubmittal of Shop Drawings, if Contractor has submitted Shop Drawings in accordance with the City-approved submittal schedule, or upon resubmission, City will be provided with three (3) calendar weeks for review. Should City require additional review time above and beyond the three (3) calendar weeks, Contractor may ask for a time extension or monetary compensation, if they can present valid, factual evidence that actual damages were incurred by Contractor. City will determine the amount of the time extension or the monetary compensation to be awarded Contractor, if any, in accordance with City's Policy Statement for Calculating Delays and Damages, Appendix 1.
- 4.7.3.11 Contractor will be responsible for all extra costs incurred by City caused by Contractor's failure to comply with the procedure outline above.
- 4.7.4 Long Lead Time Items. Contractor must submit Shop Drawings, as required by the Engineer, on all long lead items to be furnished and installed as part of the project within 10 Days after the date of the executed Agreement letter issued by City. In addition, Contractor must order all long lead items to be furnished and installed as part of this Project within 3 Days after receiving approved Shop Drawings. For all long lead times for which Shop Drawings are not required, Contractor must order said long lead items within 15 Days after the date of the executed Agreement letter issued by City. Within 2 Days after ordering long lead items, Contractor must supply copies of all purchase orders, along with an accurate delivery schedule from the supplier.
- 4.7.5 Construction Water. If Contractor uses water from City's water system for construction water, Contractor must obtain a fire hydrant meter from City of Chandler Utility Services (480-782-2280) and all construction water must be obtained through the hydrant meter. Contractor must pay all fees related to the hydrant meter and all water bills for construction water. All cost for meters and construction water will be included in the Agreement Price.
- 4.8 **PROJECT RECORD DOCUMENTS**
- 4.8.1 During the construction period, Contractor must maintain at the jobsite a full-size set of prints of the Construction Document Drawings and Shop Drawings for Project Record Document purposes.

- 4.8.2 Contractor must mark these Drawings to indicate the actual installation where the installation varies from the original Construction Documents. Contractor must give particular attention to information on elements that will be concealed, which would be difficult to identify or measure and record later. Items required to be marked include but are not limited to:
- a. Dimensional changes to the Drawings.
  - b. Revisions to details shown on Drawings.
  - c. Locations and depths of underground utilities.
  - d. Revisions to routing of piping and conduits.
  - e. Actual equipment locations.
  - f. Changes made by Change Order or Addendum.
  - g. Details not on original Agreement Drawings.
- 4.8.3 Contractor must mark completely and accurately Project Record Drawing sets of Construction Documents.
- 4.8.4 Contractor must mark Project Record Drawings sets with red erasable colored pencil.
- 4.8.5 Contractor must note Request for Information (RFI) Numbers and Change Order numbers, etc., as required to identify the source of the change to the Construction Documents.
- 4.8.6 Contractor must submit Project Record Drawing sets and Shop Drawings to City or its representative for review and comment.
- 4.8.7 Upon receipt of the reviewed Project Record Drawings from City, Contractor must correct any deficiencies and omissions to the Drawings and submit the final original of the Project Record Drawings to City prior to Final Payment.
- 4.8.8 Project Manager will review the Project Record Drawings monthly prior to the date established for the Payment Request and will be the sole judge of acceptance of these Drawings.
- 4.9 **WARRANTY AND CORRECTION OF DEFECTIVE WORK**
- 4.9.1 Contractor warrants to City that the construction, including all materials and equipment furnished as part of the Work, will be new unless otherwise specified in the Agreement Documents, of good quality, and free of defects in materials and workmanship. Contractor's warranty obligation excludes defects caused by abuse, alterations, or unreasonable failure to maintain the construction by persons other than Contractor, subcontractors, or others under Contractor's control. Nothing in this warranty will limit any manufacturer's warranty which provides City with greater warranty rights than set forth herein or in the Agreement. Contractor will provide City with all manufacturers' warranties and operation and maintenance manuals upon substantial completion of the Work. Contractor's warranty must be for one (1) year, in accordance with MAG Specification § 108.8, and will commence for all portions of the Work upon Final Acceptance of the entire Work as determined by City under the Agreement. All statutory or other warranties, express or implied, related to latent defects will remain in force and are not limited by this provision.
- 4.9.2 City May Stop the Work. If the Work is defective, or Contractor fails to supply sufficient skilled workmen or suitable materials or equipment, City may order Contractor to stop the



Work without cost to City, or any portion thereof, until the cause for such order has been eliminated; however, this right of City to stop the Work will not give rise to any duty on the part of City to exercise this right for the benefit of Contractor or any other party.

4.9.3 Correction or Removal of Defective Work.

4.9.3.1 If required by City, Contractor must promptly, without cost to City and as specified by City, either correct any defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by City, remove it from the Site and replace it with non-defective Work. Contractor must correct any Work which may be displaced in correcting, removing or replacing defective Work. No compensation will be allowed Contractor for such removal, replacement or remedial Work. Contractor must reimburse City for costs incurred by City due to such correction or removal including but not limited to additional expenses for inspection, testing or observation and for repeated reviews by the City or Design Professional.

4.9.3.2 Upon failure on the part of the Contractor to comply within a reasonably prompt time with any written order of City to correct or remove defective Work, City has authority to cause nonconforming materials or rejected Work to be remedied, removed, or replaced at the Contractor's expense and to deduct the costs from any moneys due or to become due the Contractor.

4.9.4 City May Correct Defective Work. If Contractor fails within a reasonable time after written notice of City to proceed to correct defective Work or to remove and replace rejected Work as required by City or if Contractor fails to perform the Work in accordance with the Agreement Documents (including any requirements of the progress schedule), City may, after 7 Days' written notice to Contractor, correct and remedy any such deficiency. To the extent necessary to complete corrective and remedial action, City may exclude Contractor from all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site and incorporate in the Work all materials and equipment stored at the Site or for which City has paid Contractor, but which are stored elsewhere. Contractor must allow City, city representatives, agents and employees such access to the Site as may be necessary to enable City to exercise City's rights under this Section. All direct and indirect costs of City in exercising such rights will be charged against Contractor in an amount verified by City representative, and a Change Order will be issued incorporating the necessary revisions in the Agreement Documents and a reduction in the Agreement Price. Such direct and indirect costs will include, in particular but without limitation, compensation for additional professional services required and all costs of repair and replacement of Work or others destroyed or damaged by correction, removal or replacement of Contractor's defective Work. Contractor will not be allowed an extension of the Agreement Time because of any delay in Contractor's performance of the Work attributable to the exercise by City or City's rights hereunder.

4.9.5 Correction or Removal of Unauthorized Work.

4.9.5.1 Any Work done beyond the lines and grades shown on the Drawings or established by the Design Professional or any changes in, additions to, or deductions from the Work done without written authority will be considered as unauthorized and will not be paid for. Work so done may be ordered remedied, removed, or replaced at the Contractor's expense.

4.9.5.2 Upon failure on the part of the Contractor to comply promptly with any order of the City,

City will have authority to cause unauthorized Work to be remedied, removed, or replaced at the Contractor's expense and to deduct the costs from any moneys due or to become due the Contractor.

4.9.6 Correction Period - One Year Guarantee.

4.9.6.1 If, within one year after the date of Final Acceptance, or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Agreement Documents, or by any specific provision of the Agreement Documents, any Work is found to be defective, Contractor must promptly, without cost to City and in accordance with City's written instructions, either correct such defective Work, or, if it has been rejected by City, remove it from the Site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, City may have the defective Work corrected or the rejected Work removed and replaced, and all direct and indirect costs of such removal and replacement, including compensation for additional professional services, must be paid by Contractor. Such action by the City will not relieve the Contractor of the guarantees required by this Section or elsewhere in the Agreement Documents.

4.9.6.2 If, in the opinion of the City, defective Work creates a dangerous condition or requires immediate correction or attention to prevent further loss to the City or to prevent interruption of operation of the City, the City will attempt to give the notice required by this Section. If the Contractor cannot be contacted or does not comply with the City's request for correction within a reasonable time as determined by the City, the City may, notwithstanding the provisions of this Section, proceed to make such correction or provide such attention; and the costs of such correction or attention will be charged against the Contractor. Such action by the City will not relieve the Contractor of the guarantees required by this Section or elsewhere in the Agreement Documents.

4.9.6.3 This Section does not in any way limit the guarantee on any items for which a longer guarantee is specified or on any items for which a manufacturer or supplier gives a guarantee for a longer period. The Contractor agrees to act as co-guarantor with such manufacturer or supplier and must furnish the City all appropriate guarantee or warranty certificates upon completion of the Project. No guarantee period, whether provided for in this Section or elsewhere, will in any way limit the liability of Contractor or their sureties or insurers under the indemnity or insurance provisions of these General Conditions and the Project Specific Special Conditions.

4.9.7 Acceptance of Defective Work.

4.9.7.1 If, instead of requiring correction or removal and replacement of defective Work, City may accept Work when in the best interest of the City to do so with appropriate monetary credit from Contractor. If any such acceptance occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Agreement Documents, including appropriate reduction in the Agreement Price; or, if the acceptance occurs after final payment, an appropriate amount must be paid by Contractor to City.

4.9.7.2 Alternatively, City may require Contractor to furnish at Contractor's expense, a special performance guarantee or other surety prior to acceptance of defective work.

4.9.8 The Warranty period begins on the Final Acceptance date noted in the Certificate of Completion, irrespective of early completion by some Subcontractors of their work.

- 4.9.9 Contractor's warranty obligation must be in accordance with MAG Specifications.
- 4.9.10 Nothing in the warranties contained in the Agreement Documents are intended to limit any manufacturer's warranty which provides City with greater warranty rights than set forth in this Section or the Agreement Documents. Contractor must provide City with all manufacturers' warranties prior to Substantial Completion, if applicable, or Final Acceptance.
- 4.9.11 Contractor agrees that it will be responsible to manage and administer the correction of any Work that is not in conformance with the Agreement Documents during the warranty periods set forth in this Section, or during any longer periods to the extent required by the Agreement Documents. A progress payment, or partial or entire use or occupancy of the Project by City, will not constitute acceptance of Work not in accordance with the Agreement Documents.
- 4.9.12 When notified of a warranty issue, Contractor must respond in writing within 48-hours and must perform warranty Work as soon as material for said repairs are available (as judged solely by City), and in any event Contractor must, take immediate steps to commence and complete correction of nonconforming Work no later than the time period set forth in City's written notification in accordance with the Agreement Documents. This includes the correction, removal or replacement of the nonconforming Work and any damage caused to other parts of the Work affected by the nonconforming Work. If defects develop which are determined by City to be an emergency, City will notify Contractor, via the most expeditious means regarding the nature and condition of the defects. In turn, Contractor must immediately dispatch necessary forces to correct the defect or the emergency condition in accordance with Agreement Documents.
- 4.9.13 The time periods referenced in this Section apply only to Contractor's obligation to correct nonconforming Work and is not intended to constitute a period of limitations for any other rights or remedies that City may have regarding Contractor's other obligations under the Agreement Documents.
- 4.9.14 Without limiting the foregoing or anything in these General Conditions or the Agreement to the contrary, Contractor must obtain and provide to City all warranties for any portion of the Project offered by the manufacturer, installer or provider thereof. City and the user of the facility will have the right to the full value and benefit of all such warranties. Contractor must ensure all such warranties are fully transferrable to facilitate the full value of this Section.
- 4.9.15 Contractor's warranty excludes damages or defects caused by abuse, alterations to the Work not executed by or through Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage.
- 4.9.16 In the event of any noncompliance with this entire Section 4, City may require Contractor to stop or suspend the Work in whole or in part.

## **SECTION 5 - CITY RESPONSIBILITIES**

### **5.1 CITY PROJECT MANAGER AND INSPECTORS**

- 5.1.1 Project Manager is responsible for providing City-supplied information and approvals in a timely manner to assist Contractor to fulfill its obligations under the Agreement Documents.

- 5.1.2 Project Manager will also provide Contractor with prompt notice when it observes any failure on the part of Contractor to fulfill its contractual obligations, including any default or defect in the Project or non-conformance with the Drawings and Specifications.
- 5.1.3 City may utilize Field Inspectors to assist Project Manager during construction in observing performance of Contractor. City's use of Inspectors is for the purpose of assisting Project Manager.
- 5.1.4 The Inspectors are authorized to inspect all Work and materials furnished. Such inspections may extend to all or part of the Work and to preparation, fabrication or manufacture of the materials to be used. The Inspectors have the authority to issue instructions contrary to the Construction Documents if approved and coordinated with the directions of Project Manager.
- 5.1.5 The Inspectors have the authority to reject work or materials until any questions at issue can be decided by Project Manager.
- 5.1.6 The use of Inspectors by City will not make City responsible for or give City control over construction means, methods, techniques, sequences or procedures or for safety precautions or programs or responsibility for Contractor's failure to perform the Work in accordance with Agreement Documents. The Inspectors are not authorized to direct any of Contractor's activities, employees or Subcontractors.

5.2 **DESIGN PROFESSIONAL SERVICES**

City may contract separately with one or more Design Professionals to provide construction administration of the Project. The Design Professional's Agreement, as well as other firms hired by City may be furnished to Contractor. Contractor does not have the right to limit or restrict or reject any Agreement modifications that are mutually acceptable to City and Design Professional.

5.3 **CITY'S SEPARATE CONTRACTORS**

City is responsible for all work performed on the Project or at the Site by separate contractors retained by City. City will contractually require its separate contractors to reasonably cooperate with, and reasonably coordinate their activities so as not to interfere with Contractor in order to enable Contractor to timely complete the Work consistent with the Agreement Documents. Contractor must immediately notify the Project manager, and address the matter in the next monthly status report, if any activities of such separate contractors are expected to interfere, or are interfering, with Contractor and such interference will or could result in any delay in Contractor's performance of the Work.

5.4 **PERMIT REVIEW AND INSPECTIONS**

- 5.4.1 If requested by Contractor, Project Manager will provide assistance and guidance in obtaining necessary reviews, permits and inspections.
- 5.4.2 The regulating agencies of City, such as Development and Sustainability, Fire and Planning Departments, enforce legal requirements. The enforcement activities of City are independent and separate from this Agreement.

5.5 **PLANS AND SPECIFICATIONS TO THE CONTRACTOR**

Contractor will be provided up to five copies of the Agreement Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished,

upon request, at the cost of reproduction.

## **SECTION 6 - AGREEMENT TIME**

### **6.1 AGREEMENT TIME**

- 6.1.1 The Agreement Time will start with the Notice to Proceed ("NTP") and end with Final Acceptance.
- 6.1.2 Beginning on the date of the NTP, Contractor must begin to fulfill Contractor's obligations under the Agreement. Contractor's obligations include providing City and other agencies with any submittals required by the Project Specific Special Provisions, including but not limited to, an approved Project Schedule, Traffic Control Plans, and a Stormwater Pollution Prevention Plan. Contractor must submit all such required submittals before any physical construction work commences on the Site. NTP does not authorize construction work until all agreement insurance, bonds, and schedules are submitted to and accepted by the City.
- 6.1.3 The Agreement Time will be as set forth in the Project Schedule. Contractor agrees that it will commence performance of the Work and complete the Project through both Substantial Completion and Final Acceptance within the Agreement Time.
- 6.1.4 Time is of the essence of this Agreement, for the Project, for the Work, and for each phase and designated Milestone thereof.
- 6.1.5 Failure of Contractor to perform any covenant or condition contained in the Agreement Documents within the time periods specified herein, will constitute a material breach of this Agreement entitling City to terminate the Agreement unless Contractor applies for and receives an extension of time, in accordance with the procedures set forth in the Agreement Documents.
- 6.1.6 Failure of City to insist upon the performance of any covenant or condition within the time periods specified herein, will not constitute a waiver of Contractor's duty to perform every other covenant or condition within the designated periods, unless a specific waiver is granted in writing for each such covenant or condition.
- 6.1.7 City's agreement to waive a specific time provision or to extend the time for performance will not constitute a waiver of any other time provisions contained in the Agreement Documents. Failure of Contractor to complete performance promptly within the additional time authorized in the waiver or extension of time agreement constitutes a material breach of this Agreement entitling City to all the remedies set forth herein or provided by law.

### **6.2 PROJECT SCHEDULE**

- 6.2.1 The Project Schedule must be in Microsoft Project standard file format, must be updated and maintained throughout the Agreement Time, and must contain the following:
  - 6.2.1.1 Detailed representation of all activities for the project, both on-site construction and major procurement. All significant activities together with the resource loading requirements for each and all items appearing on the schedule of values or bid schedule for progress payments must be shown on the Project Schedule or in attached transmittal letter as described in Section 6.2.8.

- 6.2.1.2 Dependencies between activities must be indicated so that it may establish as to the effect the progress of any one activity would have on other activities and on the Schedule.
- 6.2.1.3 Activities for submission, review, and approval of all required submittals.
- 6.2.1.4 An amount of time will be established prior to the final completion date for “punch list and cleanup”. No other activities will be scheduled during this period. Punch list and cleanup must be shown on the Project Schedule and must be entirely completed prior to the expiration of the Agreement Time.
- 6.2.2 Within 10 Days of receipt of City’s comments, Contractor must make all required corrections, adjustments, and additions to complete the Project Schedule and resubmit to City for review. City’s review of and response to the Project Schedule is for the purpose of: (1) City planning and staffing for the Project as may be required from time to time; (2) ensuring Contractor’s general conformance with the scheduling requirements of the Agreement Documents and completion of the Project within the Agreement Time; and (3) monitoring and evaluating the construction status for purposes of approving monthly progress payments. Acceptance of a submitted schedule by City should in no way be construed as an affirmation or admission that the schedule is reasonable or workable by Contractor. The responsibility for completing the Work on the Project within the Agreement Time remains the obligation of Contractor. City’s review does not relieve Contractor from compliance with the requirements of the Agreement Documents or be construed as relieving Contractor of its complete and exclusive control over the means, methods, sequences and techniques for executing the work.
- 6.2.3 The Project Schedule must show milestones, including milestones for City-furnished information, and must include activities for City-furnished material and construction by other contractors when those activities are interrelated with Contractor activities.
- 6.2.4 The Project Schedule must be revised as required by conditions and progress of the Work, but such revisions do not relieve Contractor of its obligations to complete the Work within the Agreement Time, as adjusted in accordance with the Agreement Documents. No modification to the Agreement Documents or the Agreement Time will be effective unless approved in advance by City.
- 6.2.5 For all items of materials and equipment that are critical or may require long lead times to acquire, the Project Schedule must show dates for submission, review and approval of submittals, ordering, and delivery.
- 6.2.6 An updated Project Schedule must be submitted monthly to City as part of the Payment Request. The monthly submittal must include one full size plot of the entire schedule and one electronic copy containing the schedule in Microsoft Project standard file format. In addition, Contractor must, upon request by City, provide a copy of all submitted schedule data in electronic format which must be clearly labeled with the Project description, scheduling program name and version number, and schedule print/data date.
- 6.2.7 Contractor must provide City with a monthly status report with each Project Schedule detailing the progress of the Work, including: (i) if the Work is proceeding according to schedule, (ii) any discrepancies, conflicts, or ambiguities found to exist in the Agreement Documents that require resolution, and (iii) other information detailing items that require resolution so as not to jeopardize the ability to complete the Work in the Agreement Time.

- 6.2.8 With each Project Schedule submittal, Contractor must include a transmittal letter including the following:
- a. Description of problem tasks, referenced to field instructions or requests for information (RFI's), as appropriate.
  - b. Current and anticipated delays including:
    - (i) Cause of the delay.
    - (ii) Corrective action and schedule adjustments to correct the delay.
    - (iii) Known or potential impacts and their delay on other activities, milestones, and their impact on the Substantial Completion and Final Acceptance dates.
    - (iv) Changes in construction sequence.
  - c. Pending items and status thereof including but not limited to:
    - (i) Time Extension requests;
    - (ii) Substantial Completion date status;
    - (iii) Final Acceptance date status.
  - d. If ahead of schedule, the number of calendar Days ahead.
  - e. If behind schedule, the number of calendar Days behind.
  - f. Other Project or scheduling concerns.
- 6.2.9 Critical Path Method (CPM).
- 6.2.9.1 Unless otherwise specified in the Agreement, the Project Schedule must include a Critical Path Method (CPM) diagram schedule showing the sequence of activities, the interdependence of each activity and identifies the Critical Path.
- 6.2.9.2 The CPM diagram schedule must be in calendar Days and indicate duration, earliest and latest start and finish dates for all activities, and total Float Times for all activities except critical activities. The CPM diagram must be presented in a time scaled graphical format for the Project as a whole.
- 6.2.9.3 The CPM diagram schedule must indicate all relationships between activities.
- 6.2.9.4 The activities making the Project Schedule must contain sufficient detail to assure that adequate planning has been done for proper execution of the Work and such that it provides an appropriate basis for monitoring and evaluation the progress of the Work. Individual activities must not exceed 30 Days in length, in most cases.
- 6.2.9.5 The CPM diagram schedule must be based upon activities, which coincide with the Schedule of Values.
- 6.2.9.6 The CPM diagram schedule must show all submittals associated with each work activity and the review time for each submittal.
- 6.2.10 Float Time.
- 6.2.10.1 The total Float Time within the overall schedule is for the exclusive use of City, but City may approve Contractor's use of Float as needed to meet Agreement Milestones and

the Project completion date.

- 6.2.10.2 Contractor will not be allowed to sequence, hide, or reallocate Float Time through such strategies, as extending activity duration estimates to consume available Float, using preferential logic, or using extensive crew/resource sequencing, etc. No time extensions will be granted nor delay damages paid until a delay occurs which extends the Work beyond the Agreement Time.
- 6.2.11 City-Caused Delays. City-caused delays on the Project, if any, may be offset by City-caused time savings (i.e., Critical Path submittals returned in less time than allowed by the Agreement, approval of substitution requests and credit changes which result in savings of time to Contractor, etc.) In such an event, Contractor will not be entitled to receive a time extension or delay damages until all City-caused time savings are exceeded and the Agreement Time is also exceeded.
- 6.2.12 Rain-Related Delays. Contractor is required, in preparing the Project Schedule to take into account all relevant weather conditions, including normal rainfall and distribution. No additional compensation will be given for any rain-related delays or impacts on the Work or the Project Schedule. No time extension will be granted in the Project Schedule unless the rainfall during the construction of Work is unusually severe, was not reasonably anticipated, and the total rainfall was significantly in excess of the normal rainfall for the Project Site location. Normal rainfall for the Project will be determined from the 10-year average rainfall for the Site as measured by the National Oceanic and Atmospheric Administration or comparable source of reliable information for rainfall in Chandler, Arizona. In addition, the excessive rainfall must have actually impacted Work activities on the Critical Path and caused delay beyond any remaining Float at the time of the rain-caused delay. The burden of documenting normal rainfall, the excessive rainfall and the impact on Critical Path activities is on Contractor. All other provisions in the Agreement Documents relating to claims, including without limitation notice requirements, apply to any claim by Contractor for a rain delay.
- 6.2.13 City's "Policy Statement for Calculating Delays and Damages," Appendix 1 to these General Conditions, will apply to all claims of delay and delay damages.
- 6.2.14 Force Majeure. If Contractor is delayed or prevented from the performance of any Work required under this Agreement by reason of acts of God or other causes beyond the control and without fault of Contractor (financial inability excepted), performance of that Work will be excused, but only for the period of the delay. The time for performance of the Work will be extended for a period equivalent to the period of delay. In addition, the parties agree if Contractor's delayed or suspended performance directly arises out of or directly results from the COVID-19 pandemic, Contractor's delayed or suspended performance may be excused as set forth in this clause. Provided, however; Contractor must give the City written notice within 30 days of the occurrence of the event giving rise to COVID-19 pandemic related delayed or suspended performance. For COVID-19 pandemic related delay or suspended performance, the parties must agree in writing to the length of the excused delay or suspended performance. Further, Contractor must obtain the City's written approval to use any allowance established as part of the project for delays and costs related to the COVID-19 pandemic.

6.3 **SUBSTANTIAL COMPLETION**

- 6.3.1 When Contractor considers that the Work, phase or a portion thereof, which City agrees in



writing to accept separately, is substantially complete, City will prepare and submit to Contractor a comprehensive Punch List of items to be completed or corrected prior to Final Acceptance and Final Payment. Failure to include an item on such Punch List does not alter the responsibility of Contractor to complete all Work in accordance with the Agreement Documents.

6.3.2 Upon receipt of Contractor's Punch List, Project Manager will make an inspection to determine whether the Work or designated portion thereof is substantially complete. Project Manager may, at Project Manager's sole option, be assisted in such inspection by the Design Professional for the Project. If the inspection by the Project Manager discloses any item, whether or not included on Contractor's Punch List, which is not sufficiently completed in accordance with the Agreement Documents so that City can occupy or utilize the Work, phase or designated portion thereof for its intended use, Contractor must, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by Project Manager. In such case, Contractor must then submit a request for another inspection by Project Manager to determine Substantial Completion.

6.3.3 Certificate of Substantial Completion.

6.3.3.1 The Project Manager will not issue a Certificate of Substantial Completion unless and until the Work (or separable units or Phases as provided in the Agreement Documents) is essentially and satisfactorily complete in accordance with the Agreement Documents, such that the Project is ready for use by City for its intended purpose, opening to the general public, full occupancy or use by City (including, without limitation, all separate units, or rooms, facilities, access, income-generating areas, and all areas serving the general public, as applicable, must be ready for full-operation without material inconvenience or discomfort), including, to the extent applicable to the Work, the following: all materials, equipment, systems, controls, features, facilities, accessories and similar elements are installed in the proper manner and in operating condition, inspected and approved; surfaces have been painted; masonry and concrete cleaned with any sealer or other finish applied; utilities and systems connected and functioning; site work complete; permanent heating, ventilation, air condition, vertical transportation and other systems properly operating with proper controls; lighting and electrical systems installed, operable and controlled; paving completed, signage installed, and other Work as applicable, has been performed to a similar state of essential and satisfactory completion. A minor amount of Work, as determined by and at the discretion of the Project Manager, such as installation of minor accessories or items, a minor amount of painting, minor replacement of defective work, minor adjustment of controls or sound systems, or completion or correction of minor exterior work that cannot be completed as a result of weather conditions, will not delay determination of Substantial Completion. If prior written approval is obtained from City for purposes of Substantial Completion, specified areas of the entire Work or Project may be individually certified as Substantially Complete. In no event will Substantial Completion be deemed to have occurred unless and until: (i) a temporary certificate of occupancy has been issued by the appropriate Governmental Authorities (as applicable) and (ii) all terms and Work required under this Agreement have been fulfilled by Contractor and same will have also been approved and accepted by City, subject only to the Punch List items.

6.3.3.2 If requested by City, Contractor must complete and turn-over to City the Project on a phased basis. Each phase will have a separate inspection by the Project Manager, a Punch List generated, and then an inspection by City with final approval and acceptance only after the

Project Manager's Punch List.

6.4 **PARTIAL UTILIZATION**

6.4.1 City at City's option may use and occupy any substantially completed parts of the Work which has specifically been identified in the Agreement Documents, or which City, the Design Professional and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by City for its intended purpose, without significant interference with Contractor's performance of the remainder of the Work, provided, however, if the portion of the Work to be used or occupied has not been found to be substantially complete, City must do so in accordance with Section 6.3 prior to such occupancy.

6.4.2 In lieu of the issuance of a Certificate of Substantial Completion as to part of the Work, City may take over operation of a facility constituting part of the Work whether or not it is substantially complete if such facility is functionally and separately usable; provided that prior to any such takeover, City and Contractor agree in writing as to the division of responsibilities between City and Contractor for security, operation, safety, maintenance, correction period, heat, utilities and insurance with respect to such facility.

6.4.3 Substantial Completion of or City's beneficial occupancy of a part of the Project will not alter the fact that the one-year warranty for the whole Project starts at the date of Final Completion of the whole Project.

6.5 **FINAL ACCEPTANCE**

6.5.1 Unless otherwise expressly agreed to in writing by City, Final Acceptance must be obtained by no later than 30 Days (60 Days for federally funded agreements) after the date of Substantial Completion. Failure to timely obtain Final Acceptance will be a material breach of the Agreement.

6.5.2 Upon receipt of written notice that the Work is ready for final inspection and acceptance, City and Contractor will jointly inspect to verify that the remaining items of Work have been completed. There will be no partial acceptance. Final Acceptance will not occur until all items of Work, including Punch List Items, have been completed to City's satisfaction as reflected in the written Final Acceptance.

6.5.3 Final Payment will not be due, owing, or paid by City until Final Acceptance is issued.

6.5.4 Landscape Establishment Period. Unless otherwise expressly agreed to in writing by City, the Landscape Establishment Period will begin on the date of Final Acceptance of the Project and will run 90 Calendar Days thereafter. Landscape Establishment Period requirements are detailed in General Conditions Appendices, attached herein.

6.6 **CONTINUATION OF WORK**

6.6.1 Permitting Contractor to continue and finish the Work or any part of it after the time fixed for its completion (whether milestone, phase, Substantial Completion or Final Acceptance) or after the date to which the time fixed for any completion may have been extended, does not operate as a waiver by City of any rights under the Agreement Documents, law or equity.

6.6.2 Furthermore, the timely completion of the Work being of the utmost importance under this Agreement, notwithstanding the existence of one or more disputes between the parties

concerning the scope of the Work, the Project Schedule, Agreement Time, payments or any other matter, and further notwithstanding a party's invocation of the Dispute Resolution provisions specified in Appendix 6 of these General Conditions, unless City suspends the Agreement or Contractor's performance pursuant to Section 10 of these General Conditions, Contractor will continue to prosecute the Work, including any Change Order work or Extra Work Orders, in a diligent and timely manner and not stop, slow down or impede by action or inaction the progress of the Work, including commencing performance of and thereafter completing any additional work called out in any Change Order or Extra Work Order issued by Project Manager with the approval of City, so long as City makes payment to Contractor in accordance with Section 8 of these General Conditions.

## **SECTION 7 - AGREEMENT PRICE**

### **7.1 UNIT PRICE AGREEMENTS**

- 7.1.1 The Agreement Price for all Unit Price Agreements will be the amount set forth in the Agreement or Change Order multiplied by the verified quantity provided.
- 7.1.2 Measurements of quantities to determine the total Agreement Price must be in accordance with MAG Specification §§ 109.1 and 109.2.
- 7.1.3 The Unit Price may only be changed as set forth in Section 9 below.

### **7.2 CHANGE ORDERS**

- 7.2.1 Unit Price Change Orders. The Change Order Price for all Unit Price Change Orders will be the amount set forth in the Change Order multiplied by the verified quantity provided.
- 7.2.2 Measurements of quantities to determine the total Change Order Price must be in accordance with MAG Specifications §§ 109.1 and 109.2.
- 7.2.3 The Unit Price may only be changed as set forth in Section 9 below.
- 7.2.4 MAG Specification § 109.4.1 is modified as follows: Before § 109.4.1, the following is added: Any deduction or increase in the Agreement Price must be supported by a signed, written Change Order fully executed by City, and supported by such backup as the Project Manager may require.

### **7.3 SALES TAX**

Contractor is required to pay all applicable sales tax in accordance with the law of the state of Arizona and this cost must be included in all Agreement Prices. When equipment, materials or supplies generally taxable to Contractor are eligible for a tax exemption due to the nature of the Project, Contractor must assist City in applying for and obtaining such tax credits and exemptions which will be paid or credited to City.

## **SECTION 8 - PAYMENT**

### **8.1 PAYMENT FOR CONSTRUCTION SERVICES**

- 8.1.1 Payment for the Work will be made in accordance with MAG Standard Specification § 109 as amended below.
- 8.1.2 Contractor must submit to City for review a completed Contractor Payment Request signed

by Contractor, covering the Work completed as of the date of the Request and accompanied by such supporting documentation as is required by the Agreement Documents and also as City may reasonably require. A Contractor Payment Request will not be considered complete unless it is accompanied by an updated Project Schedule and a certification that the on-site, red lined, as built Drawings are up to date. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably, securely stored at the Site or at another location (such as a bonded warehouse) agreed to in writing, the Contractor Payment Request must also be accompanied by such data, satisfactory to City, as will establish City's title to the material and equipment and protect City's interest therein, including applicable insurance. Each subsequent Contractor Payment Request must include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied to discharge in full all of Contractor's obligations reflected in prior Contractor Payment Requests.

- 8.1.3 Except for Work performed under a JOC Agreement, the Contracting Agency will retain 10 percent of all estimates as a guarantee for complete performance of the Agreement in accordance with Arizona Revised Statutes Section 34-221 or 34-607. The Contractor may elect to deposit securities in lieu of retention in accordance with Arizona Revised Statutes Section 34-221, Paragraph C.5. or 34-607, Paragraph B.5.
- 8.1.4 The payment process functions as follows: Prior to the payment cycle date, Contractor must send a draft Contractor Payment Request to Project Manager. The Project Team will review the Request and agree upon any necessary adjustments. Contractor must certify the final Request by signing and returning to Project Manager.
- 8.1.5 When construction of the Project is fifty percent (50%) completed, Contractor may request payment of one-half of the retention pursuant to A.R.S. § 34-609(B)(3), subject to all of City's rights to withhold or offset payments, and other rights of City, under the Agreement.
- 8.1.6 City reserves the right under A.R.S. § 34-609(B)(3) to reinstate the ten percent (10%) retention if City determines that satisfactory progress is not being made.
- 8.1.7 Contractor's Warranty of Title.
  - 8.1.7.1 Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Contractor Payment Request, whether incorporated in the Project or not, will pass to City at the time of payment, free and clear of all liens, claims, security interests, and encumbrances, provided that this will not preclude the Contractor from installing metering devices or other equipment of utility companies or municipalities, the title of which is commonly retained by the utility company or municipality.
  - 8.1.7.2 No materials, supplies, or equipment for the Work under this Agreement will be purchased subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest therein, or any part thereof, is retained by the seller or supplier.
  - 8.1.7.3 Nothing contained in this Section will defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor in the hands of the City. The provisions of this Section must be inserted in all subcontracts and material agreements, and notices of its provision must be given to all persons furnishing materials for the Work when no formal agreement is entered into for such materials.

**8.2            PAYMENT UPON SUBSTANTIAL COMPLETION**

8.2.1        No payment will be made upon Substantial Completion, except for a regularly-scheduled monthly progress payment, as allowed by Section 8.2.2.

8.2.2        No further payments will be made to Contractor until Final Acceptance.

**8.3            FINAL PAYMENT**

8.3.1        Subject to all of City's rights to withhold or offset payment, and other rights under the Agreement, Final Payment including remaining retainage will be paid only after:

- a. Work has been fully completed (including completion of all incorrect or incomplete work items) and the written Final Acceptance has been issued by City;
- b. Necessary operating manuals, any excess materials and supplies necessary for matching materials and supplies incorporated into the Work, acceptable sewer video results (if applicable), and complete "as-built" Drawings (including the Building Information Model, if required by the Agreement Documents) have been delivered to City, as specified in this Section 8.3;
- c. Full and unconditional lien waivers and releases by Contractor and any person performing labor or supplying material, machinery, fixtures, or tools for the Work have been delivered to Contractor;
- d. All conditions and requirements imposed by City or any financing entity for the corresponding disbursement have been met; and
- e. Contractor delivers to City a Contractor Payment Request requesting Final Payment.

8.3.2        Contractor must also submit a signed copy of Contractor's Affidavit Regarding Settlement of Claims, Appendix 3 to these General Conditions, and Certificate of Completion, Appendix 7 to these General Conditions, prior to Final Payment.

8.3.3        In addition, if required under the Project Specific Special Provisions, Contractor must compile a complete equipment list and maintenance manual to be submitted to City as a precondition to Final Payment. The list must include the following items for all equipment supplied under the Plumbing, Electrical, Air Conditioning, Elevator, and other Special Equipment Specifications:

- a. Name, Model and Manufacturer.
- b. Complete parts lists and Drawings.
- c. Local source of supply for replacement parts along with suppliers' telephone numbers.
- d. Local service organizations serving the equipment and their telephone numbers.
- e. All tags, inspection slips, instruction packages, etc., removed from equipment must be properly identified as to pieces of equipment from which they were taken.

8.3.4 Contractor must also deliver to City, prior to Final Payment, one (1) digital (in the format specified by City), and if requested by City, one (1) hard copy, of any applicable Maintenance manuals. Each manual must include all manufacturer's operation and maintenance instructions and "as-built" Drawings with the list herein specified. It must also include all other diagrams and instructions necessary to properly operate and maintain the equipment, the name, address and telephone number of Contractor and all Subcontractors involved.

8.4 **CITY'S RIGHT TO WITHHOLD PAYMENT**

City may withhold payment to such extent as may be necessary in City's opinion to protect City from loss for which Contractor is responsible, including, without limitation, if any of the following conditions exist:

- a. Defective Work not remedied;
- b. Third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to City is provided by Contractor;
- c. Failure of Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- d. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Agreement Price;
- e. Damage to City or another Contractor;
- f. Reasonable evidence that the Work will not be completed within the Agreement Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- g. Failure to carry out the Work in accordance with the Agreement Documents;  
or
- h. Contractor is in default of any of its other obligations under the Agreement Documents.

8.5 **JOINT/DIRECT CHECKS**

To promote the timely completion and progress of the Work or when appropriate and necessary, payments to Contractor may be made jointly to Contractor and its employees, agents, Subcontractors and suppliers, or any of them. For federally funded agreements, see federal provisions for additional requirements for the joint check process.

8.6 **PAYMENT NOT A WAIVER**

No payment (nor use or occupancy of the Project by City) will be deemed acceptance or approval of the Work or as a waiver of any claims, rights, or remedies of City.

8.7 **LIENS AND BOND CLAIMS**

Contractor must make all payments, in the time required, of all labor and materials furnished to Contractor in the course of the Work and must promptly furnish evidence of such payments as City may require. Contractor must pay when due all claims arising out of performance of the Work covered by this Agreement for which a lien may be filed either against the real estate or leasehold interest of City, or against payments due from City to Contractor, or for which a claim may be made against any payment or performance bond or both. To the fullest extent permitted by law, Contractor agrees that no liens or other claims in the nature of a lien against the real estate, leasehold, or other interest of City,

against payment due from City to Contractor, or against any payment or performance bond, must be filed or made in connection with the Work by any party who has supplied professional services, labor, materials, machinery, fixtures, tools, or equipment used in or in connection with the performance of this Agreement, and Contractor agrees to remove or to cause to be removed any such liens or claims in the nature of a lien or bond claim within 10 Days upon receiving notice or obtaining actual knowledge of the existence of such liens or claim. In addition, Contractor agrees to defend, indemnify, and hold harmless City from and against any and all such liens and claims. This paragraph does not apply to claims and liens of Contractor due to non-payment for work performed.

**8.8 FINANCIAL RECORDKEEPING AND CITY'S AUDIT RIGHT**

8.8.1 Records for all Agreements between City and Contractor must, upon reasonable notice, be open to inspection and subject to audit, scanning, and reproduction during normal business working hours. Such audits may be performed by any City's representative or any outside representative engaged by City for the purpose of examining such records. City or its designee may conduct such audits or inspections throughout the term of this Agreement and for a period of five years after Final Payment or longer if required by law. City's representatives may (without limitation) conduct verifications such as counting employees at the Site, witnessing the distribution of payroll, verifying information and amounts through interviews and written confirmations with Contractor employees, field and agency labor, Subcontractors, and vendors.

8.8.2 Contractor's "records" must include any and all information, materials and data of every kind and character, including without limitation, records, books, papers, documents, subscriptions, recordings, agreements, purchase orders, leases, contracts, commitments, arrangements, notes, daily diaries, superintendent reports, drawings, receipts, vouchers and memoranda, and any and all other agreements, sources of information and matters that may in City's judgment have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Agreement Document. Such records must include (hard copy, as well as computer readable data if it can be made available), written policies and procedures; time sheets; payroll registers; payroll records; cancelled payroll checks; subcontract files (including proposals of successful and unsuccessful bidders, bid recaps, negotiation notes, etc.); original bid estimates; estimating work sheets; correspondence; Change Order files (including documentation covering negotiated settlements); back-charge logs and supporting documentation; invoices and related payment documentation; general ledger, information detailing cash and trade discounts earned, insurance rebates and dividends; and any other Contractor records which may have a bearing on matters of interest to City or the Project in connection with Contractor's dealings with City or the Project (all foregoing hereinafter referred to as "records") to the extent necessary to adequately permit evaluation and verification of any or all of the following:

- a. Compliance with Agreement requirements for deliverables;
- b. Compliance with approved Plans and Specifications;
- c. Compliance with § 14.9 below;
- d. Compliance with Agreement provisions regarding the pricing of Change Orders;
- e. Accuracy of Contractor representations regarding the pricing of invoices; or
- f. Accuracy of Contractor representations related to claims submitted by

Contractor or any of their employees.

- 8.8.3 Contractor must require all payees (examples of payees include Subcontractors, Suppliers, Insurance Carriers, etc.) to comply with the provisions of this Section by including the requirements hereof in a written agreement between Contractor and payee. Contractor will ensure that all payees (including those entering into lump sum agreements) have the same right to audit provisions contained in this Agreement included in their agreements with Contractor.
- 8.8.4 City's authorized representative(s) (including, without limitation, Project Manager) must have reasonable access to Contractor's facilities, must be allowed to interview all current or former employees to discuss matters pertinent to the performance of this Agreement and must be provided adequate and appropriate work space, in order to conduct audits in compliance with this Section.
- 8.8.5 If an audit inspection or examination in accordance with this Section, discloses overpricing or overcharges to City (of any nature) by Contractor or Contractor's Subcontractors in excess of \$100,000 in addition to making adjustments for the overcharges, the reasonable actual cost of City's audit must be reimbursed to City by Contractor. Any adjustments or payments which must be made as a result of any such audit or inspection of Contractor's invoices or records must be made within a reasonable amount of time (not to exceed 90 Days) from presentation of City's findings to Contractor.
- 8.8.6 In addition to the normal paperwork documentation Contractor typically furnishes to City, Contractor agrees to furnish, upon written request from City, any of the documentation necessary for City to exercise its audit rights under this Section 8.8 in computer readable file formats (Word, Excel, or .pdf), as City may designate.
- 8.8.7 City, its authorized representative, and the appropriate agency, reserve the right to audit Contractor's records in compliance with local, state or federal policies, statutes or at City's discretion, within three (3) years of Final Acceptance of the Work.

## **SECTION 9 - CHANGES TO THE AGREEMENT**

### **9.1 FIELD ORDERS**

City may authorize minor changes in the Work not involving an adjustment in the Agreement Price or the Agreement Times, which are consistent with the overall intent of the Agreement Documents. These may be accomplished by a written Field Order on the standard form approved and executed by City. Such Field Orders must be binding and Contractor must perform the change promptly. If Contractor believes that a Field Order justifies an increase in the Agreement Price or Agreement Time, Contractor may make a claim therefor as provided in Section 7.2.

### **9.2 EXTRA WORK/CHANGES IN THE WORK**

- 9.2.1 City reserves the right to make such changes in the Plans and Specifications for the Work, as it may deem appropriate and any such change as set forth in a written Change Order must be deemed a part of this Agreement as if originally incorporated herein.
- 9.2.2 In the event City and Contractor cannot agree on the terms of a Change Order, or when circumstances otherwise require, the Project Manager has the authority to direct the Contractor to perform extra work, if the work in question is an item not provided for in the



Agreement as awarded. The Project Manager will have the authority to determine, based upon factual evidence presented by the Contractor, whether the work in question is an item not provided for in the Agreement as awarded. If the Project Manager directs the Contractor to perform extra work, the Project Manager's instructions will include a price that the Contractor cannot exceed in charging the City for the extra work. Upon receipt of the Project Manager's directions to perform extra work, the Contractor must promptly proceed with the extra work and document the actual cost thereof. Contractor's right to payment for extra work will be determined under Subsection 9.2.4 below. The Contractor is responsible to manage the extra work to ensure that the price limits set by the Project Manager are not exceeded. Contractor must perform the extra work and submit documentation for the actual cost of the extra work to the City. A Change Order will be issued to cover this work.

9.2.3 Contractor will not be entitled to payment for extra work unless a written Change Order, in form and content prescribed by City, has been executed by City. On all requests for Change Orders, Contractor must specify the increased or decreased costs and whether it believes any extensions of time will be necessary to complete its Work as modified by the Change Order. If extra work is performed under Subsection 9.2.2 above, a corresponding Change Order will be prepared, approved and processed by City before payment can be made to Contractor.

9.2.4 In general, pricing for Change Orders will include the same mark-up percentages that were in effect when the Agreement was awarded. The cost or credit to the City resulting from a change in the Work is subject to Appendix 1 (Policy Statement for Calculating Delays and Damages) and will be determined, based on the type of pricing for the Agreement involved, as follows:

- a. By mutual acceptance of a lump sum properly itemized in a form acceptable to City;
- b. By unit prices stated in the Agreement Documents;
- c. When the City determines that a Unit Price Book Job Order associated with a Job Order Agreement requires a Change Order, by using the same Total Cost Data and CCI that are in effect when the Change Order is anticipated to be issued; or
- d. By actual cost and a percentage fee covering overhead and profit, as follows:
  - (i) Contractor will perform the extra work and be compensated for actual cost of labor, materials and equipment.
  - (ii) Contractor will have the right to add the fee percentage applicable to the Work under the Agreement, or if no such fee has been agreed to by the parties, not more than five percent (5%) to the Subcontractor's prices for authorized extra work performed solely by Subcontractors. Such percentage will include all of Contractor's charges for overhead, profit, administration and supervision.
  - (iii) Contractor or Subcontractor will have the right to add the fee percentage applicable to Work under the Agreement for self-performed extra work, or if no such fee has been agreed to by the parties, Contractor's or Subcontractor's maximum total allowable additions for overhead, profit, administration and supervision will

not exceed ten percent (10%) of actual verifiable labor, materials and equipment for such self- performed extra work.

- 9.2.5 Any agreement which modifies the terms of the Agreement (including Change Orders) will be approved in writing by the Project Manager. Once properly executed by both parties, these modifications to the Agreement will have the same effect as if they had been included in the original Agreement.

9.3 **ACCURACY OF CHANGE ORDER PRICING INFORMATION**

- 9.3.1 Subject to Sections 9.3.2 through 9.3.4, signature by the contracting parties constitutes full accord and satisfaction between City and Contractor for all costs, damages, and expenses of whatever kind of nature, including delay, impact or acceleration damages, which may be occasioned by a Change Order of other modification of the Agreement agreed to in writing.

- 9.3.2 Accurate Change Order Pricing Information: Contractor agrees that it is responsible for submitting accurate cost and pricing data to City to support its Fixed Price, Unit Price, or Cost Plus Change Order Proposals or other Agreement Price adjustments under the Agreement. Contractor further agrees to submit Change Order proposals with cost and pricing data which is accurate, complete, current, and in accordance with the terms of the Agreement with respect to pricing of change orders. Contractor agrees that any “buy-out savings” on Change Orders will accrue 100% to Owner. “Buy-out savings” are defined as any savings negotiated by the Contractor with a Subcontractor or a Material Supplier after receiving approval of a Change Order amount that was designated to be paid to a specific Subcontractor or Supplier for the Approved Change Order work.

- 9.3.3 Right to Verify Change Order Pricing Information: Contractor agrees that City, through its designated representative, will have the right to examine, copy, and scan the records of the Contractor, Subcontractor or Sub-Subcontractor’s records (during the Agreement period and up to three years after final payment is made on the Agreement) to verify the accuracy and appropriateness of the pricing data used to price all Change Order proposals or claims. Contractor agrees that if City determines the cost and pricing data submitted (whether approved or not) was inaccurate, incomplete, not current, or not in compliance with the terms of the Agreement regarding pricing of Change Orders, an appropriate Agreement Price adjustment will be made. Such post-approval Contact Price adjustments will apply to all levels of contractors and Subcontractors and to all types of Change Order proposals, specifically including Fixed Price, Unit Price, and Cost Plus Change Orders.

- 9.3.4 Requirements for Detailed Change Order Pricing Information: Contractor agrees to provide a detailed breakdown of allowable labor and labor burden cost (i.e., base wage rate of applicable classifications of workers, payroll taxes, and insurance and benefits costs). This information will be used to evaluate the potential cost of labor and labor burden related to Change Order work. It is intended that this information represent an accurate estimate of the Contractor’s actual labor and labor burden cost components. Information is not intended to establish fixed billing or Change Order pricing labor rates. However, at the time Change Orders are priced, the submitted cost data for labor rates may be used to price Change Order work. The accuracy of any such agreed upon labor rate cost components used to price Change Orders will be subject to later audit. Approved Change Order amounts may be adjusted later to correct the impact of inaccurate labor cost components if the agreed upon labor cost components are determined to be inaccurate.

9.4 **EMERGENCIES**

In any emergency affecting the safety of persons or property, Contractor will act, at its discretion, to prevent threatened damage, injury or loss. Any change in the Agreement Price or Agreement Time resulting from emergency work will be determined as provided in this Section.

9.5 **DIFFERING SITE CONDITIONS**

9.5.1 If Differing Site Conditions are encountered at the Project Site, then notice by the observing party must be given to the other party promptly before conditions are disturbed (to the extent practicable) and in no event later than 14 Days after first observance of the conditions. City will promptly investigate such conditions and, if City determines that Differing Site Conditions exist and they materially cause an increase in the cost of, or time required for, performance of any part of the Work, Contractor will be entitled to equitable adjustment in the Agreement Price or Construction Schedule (and other time requirements), or both. If it is determined by City that the conditions at the Project Site are not Differing Site Conditions and no change is justified, then City will so notify Contractor in writing, stating the reasons. Claims in opposition to such determination must be made within 14 Days after City has given notice of its decision. If City and Contractor cannot agree on an adjustment in the Agreement Price or Construction Schedule (and other time requirements), the adjustment may be submitted to dispute resolution as provided these General Conditions.

9.6 **CHANGES IN LAWS, REGULATIONS, OR LEGAL REQUIREMENTS OR TAXES**

In the event of a material change in applicable Laws, Regulations, or Legal Requirements, or taxes subsequent to the date of the Agreement by the parties, Contractor may be entitled to a Change Order, in City's discretion, to the extent Contractor can document to the satisfaction of City that such change significantly increases Contractor's actual cost of performance of the Work.

**SECTION 10 -SUSPENSION AND TERMINATION**

10.1 **SUSPENSION**

City may suspend the Agreement and Contractor's performance in accordance with MAG Specifications § 105.1 and 108.7.

10.2 **TERMINATION BY THE CITY FOR CAUSE**

10.2.1 MAG Specifications § 108.11 applies to the Agreement.

10.2.2 City may also terminate the Agreement if City determines, in its sole discretion that Contractor has:

- a. After prior written notice, refused or failed to supply enough properly skilled workers or proper materials;
- b. After prior written notice, failed to make payment to Subcontractors for materials or labor in accordance with the respective agreements between Contractor and the Subcontractors;
- c. After prior written notice, disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction;
- d. After prior written notice, repeatedly failed to comply with written directives from City;

- e. Is adjudged as bankrupt or insolvent;
- f. Made a general assignment for the benefit of creditors;
- g. Appointed a trustee or receiver for itself or any of its property;
- h. Filed a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws; or
- i. Otherwise breached a provision of the Agreement Documents or any other Agreement between City and Contractor.

10.2.3 When any of the above reasons exist, City may terminate the Agreement, without prejudice to any other rights or remedies of City, after giving Contractor and Contractors' surety, if any, 7 Days written notice of City's intent to terminate the Agreement and Contractor's failure to cure any such reasons. Upon such termination, City may: (1) take possession of the Site and of all materials thereon owned by Contractor; or (2) finish the Work by whatever reasonable method City may deem expedient. When City terminates the Agreement for one of the reasons state above, Contractor will not be entitled to receive further payment until the Work is finished. If the unpaid balance of the Agreement Price existing at the time of such termination exceeds the costs and expenses of finishing the Work and any other damages incurred by City, such excess will be paid to Contractor. If such costs, expenses and damages exceed such unpaid balance, Contractor must pay the difference to City. This obligation for payment will survive termination of the Agreement.

10.3 **TERMINATION BY CITY FOR CONVENIENCE**

City may also terminate the Agreement at any time for its convenience upon 7 Days written notice to Contractor specifying the termination date. In the event of termination which is not the fault, in whole or in part, of Contractor, City will pay to Contractor only such compensation, including reimbursable expenses, due for Work properly performed on the Project prior to the termination date. Upon any termination of the Agreement, no further payments will be due from City to Contractor.

10.4 **A.R.S. § 38-511**

The Agreement is subject to, and may be terminated by City in accordance with, the provisions of A.R.S. § 38-511.

## **SECTION 11 -INSURANCE AND BONDS**

11.1 **INSURANCE REQUIREMENTS**

11.1.1 After Agreement award, the Contractor must furnish the City a certificate of insurance on a standard insurance industry ACORD form. The ACORD form must be issued by an insurance company authorized to transact business in the State of Arizona possessing a current A.M. Best, Inc. rating of A-7, or better and legally authorized to do business in the State of Arizona with policies and forms satisfactory to City. Provided, however, the A.M. Best rating requirement may not be deemed to apply to required Worker's Compensation coverage.

11.1.2 The Contractor and any of its Subcontractors must procure and maintain, until all of their obligations have been discharged, including any warranty periods under this Agreement are satisfied, the insurances set forth below.

11.1.3 The insurance requirements set forth below are minimum requirements for this Agreement and in no way limit the indemnity covenants contained in this Agreement.

- 11.1.4 The City in no way warrants that the minimum insurance limits contained in this Agreement are sufficient to protect Contractor from liabilities that might arise out of the performance of the Agreement services under this Agreement by Contractor, its agents, representatives, employees, or Subcontractors and the Contractor is free to purchase any additional insurance as may be determined necessary.
- 11.1.5 Failure to demand evidence of full compliance with the insurance requirements in this Agreement or failure to identify any insurance deficiency will not relieve the Contractor from, nor will it be considered a waiver of its obligation to maintain the required insurance at all times during the performance of this Agreement.
- 11.1.6 Use of Subcontractors: If any Work is subcontracted in any way, the Contractor must execute a written agreement with Subcontractor containing the same Indemnification Clause and Insurance Requirements as the City requires of the Contractor in this Agreement. The Contractor is responsible for executing the Agreement with the Subcontractor and obtaining Certificates of Insurance and verifying the insurance requirements.
- 11.2 **MINIMUM SCOPE AND LIMITS OF INSURANCE**
- 11.2.1 The Contractor must provide coverage with limits of liability not less than those stated below.
- 11.2.1.1 Commercial General Liability-Occurrence Form. Contractor must maintain "occurrence" form Commercial General Liability insurance with a limit of not less than \$2,000,000 for each occurrence, \$4,000,000 aggregate. Said insurance must also include coverage for products and completed operations, independent contractors, personal injury and advertising injury. If any Excess insurance is utilized to fulfill the requirements of this paragraph, the Excess insurance must be "follow form" equal or broader in coverage scope than underlying insurance.
- 11.2.1.2 Automobile Liability-Any Automobile or Owned, Hired and Non-Owned Vehicles. Contractor must maintain Business/Automobile Liability insurance with a limit of \$1,000,000 each accident on Contractor owned, hired, and non-owned vehicles assigned to or used in the performance under this Agreement. If any Excess or Umbrella insurance is utilized to fulfill the requirements of this paragraph, the Excess or Umbrella insurance must be "follow form" equal or broader in coverage scope than underlying insurance.
- 11.2.1.3 Workers Compensation and Employers Liability Insurance. Contractor must maintain Workers Compensation insurance to cover obligations imposed by federal and state statutes having jurisdiction of Contractor employees engaged in the performance of Work under this Agreement and must also maintain Employers' Liability insurance of not less than \$1,000,000 for each accident and \$1,000,000 disease for each employee.
- 11.2.1.4 Builders' Risk/Installation Floater Insurance. The Contractor bears all responsibility for loss to all equipment or Work under construction. Unless waived in writing by the City the Contractor will purchase and maintain in force Builders' Risk/Installation Floater insurance on the entire Work until completed and accepted by the City. This insurance will be Special Causes of Loss policy form, (minimally including perils of fire, flood, lightning, explosion, windstorm and hail, smoke, aircraft and vehicles, riot and civil commotion, theft, vandalism, malicious mischief, and collapse), completed value, replacement cost policy form equal to the Agreement Price and all subsequent modifications. The Contractor's Builders'

Risk/Installation Floater insurance must be primary and not contributory.

- a. Builders' Risk/Installation Floater insurance must cover the entire Work including reasonable compensation for architects and engineers' services and expenses and other "soft costs" made necessary by an insured loss. Builders' Risk/Installation Floater insurance must provide coverage from the time any covered property comes under the Contractor's control and or responsibility, and continue without interruption during course of construction, renovation and or installation, including any time during which any Project property or equipment is in transit, off Site, or while on Site for future use or installation. Insured property must include, but not be limited to, scaffolding, false work, and temporary buildings at the Site. This insurance must also cover the cost of removing debris, including demolition as may be legally required by operation of any law, ordinance, regulation or code.
- b. The Contractor must also purchase and maintain Boiler and Machinery insurance with the same requirements as Builders' Risk/Installation Floater insurance cited above if the Work to be performed involves any exposures or insurable property normally covered under a Boiler and Machinery insurance policy or made necessary as required by law or testing requirements in the performance of this Agreement. The Contractor will be responsible for any and all deductibles under these policies and the Contractor waives all rights of recovery and subrogation against the City under the Contractor- Builders' Risk/Installation Floater insurance described herein.
- c. Builders' Risk/Installation Floater Insurance must be maintained until whichever of the following first occurs: (i) final payment has been made; or, (ii) until no person or entity, other than the City, has an insurable interest in the property required to be covered.
- d. The Builders' Risk/Installation Floater insurance must be endorsed so that the insurance will not be canceled or lapse because of any partial use or occupancy by the City.
- e. The Builders Risk/Installation Floater insurance must include as named insureds, the City, the Contractor, and all tiers of Subcontractors and others with an insurable interest in the Work who will be named as additional insureds unless they are able to provide the same level of coverage with the City and Contractor named as additional insureds. Certificates must contain a provision that the insurance will not be canceled or materially altered without at least 30 Days advance notice to the City. The City must also be named as a Loss Payee under the Builders' Risk/Installation Floater coverage.
- f. The Builders Risk/Installation Floater insurance must be written using the Special Causes of Loss policy form, replacement cost basis.
- g. All rights of subrogation under the Builders Risk/Installation Floater insurance are, by this Agreement, waived against the City, its officers, officials, agents and employees.
- h. The Contractor is responsible for payment of all deductibles under the Builders' Risk/Installation Floater insurance policy.

11.2.1.5 Pollution Liability Insurance (Including Errors and Omissions). For Job Orders, Pollution Liability Insurance is only required if applicable and determined on a project specific basis. Contractor must maintain Pollution Liability Insurance with a limit of not less than \$5,000,000 per loss, \$5,000,000 aggregate for losses caused by pollution conditions including coverage for bodily injury, property damage, defense costs, clean-up costs, and completed operations that arise from the operations of Contractor as described in this Agreement.

- a. The policy must provide for complete professional service coverage, including coverage for pollution liability that is a result of a breach of professional duties.
- b. The policy must provide for protection again claims for third-party bodily injury, property damage, or environmental damage caused for pollution conditions resulting from general contracting activities for which Contractor is legally liable.
- c. The policy must provide for cleanup costs when mandated by governmental entities, when required by law, or as a result of third-party claims.
- d. Completed Operations Coverage must be kept in place for up to the statute of repose.
- e. The policy must be endorsed to include the following additional insured language: "City, its elected officials, trustees, employees, agents, and volunteers must be named as additional insureds with respect to liability arising out of the activities performed by, or on behalf of Contractor".
- f. If Work under this Agreement requires the transportation of any hazardous material or regulated substances, Contractor must carry Auto Liability with a CA 9948 endorsement or equivalent.
- g. If Work under this Agreement requires the disposal of any hazardous materials from the job site, Contractor must obtain a certificate of insurance for Pollution Legal Liability from the disposal site operator with a limit of not less than \$5,000,000 per loss, \$5,000,000 aggregate.

### 11.3 **ADDITIONAL POLICY PROVISIONS REQUIRED**

11.3.1 Self-Insured Retentions or Deductibles. Any self-insured retentions and deductibles must be declared and approved by the City. If not approved, the City may require that the insurer reduce or eliminate any deductible or self-insured retentions with respect to the City, its officers, officials, agents, employees, and volunteers.

11.3.2 The Contractor's insurance must contain broad form contractual liability coverage.

11.3.3 The Contractor's insurance coverage must be primary insurance with respect to the City, its officers, officials, agents, and employees. Any insurance or self-insurance maintained by the City, its officers, officials, agents, and employees will be in excess of the coverage provided by the Contractor and must not contribute to it.

11.3.4 The Contractor's insurance must apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

11.3.5 Coverage provided by the Contractor must not be limited to the liability assumed under the

indemnification provisions of this Agreement.

- 11.3.6 The policies must contain a severability of interest clause and waiver of subrogation against the City, its officers, officials, agents, and employees, for losses arising from Work performed by the Contractor for the City.
- 11.3.7 The Contractor, its successors and or assigns, are required to maintain Commercial General Liability insurance as specified in this Agreement for a minimum period of 3 years following completion and acceptance of the Work. The Contractor must submit a Certificate of Insurance evidencing Commercial General Liability insurance during this 3 year period containing all the Agreement insurance requirements, including naming the required Additional Insureds set forth herein.
- 11.3.8 If a Certificate of Insurance is submitted as verification of coverage, the City will reasonably rely upon the Certificate of Insurance as evidence of coverage but this acceptance and reliance will not waive or alter in any way the insurance requirements or obligations of this Agreement.
- 11.3.9 Insurance Cancellation During Agreement Term.
- 11.3.9.1 If any of the required policies expire during the life of this Agreement, the Contractor must forward renewal or replacement Certificates to the City within 10 Days after the renewal date containing all the required insurance provisions.
- 11.3.9.2 Each insurance policy required by the insurance provisions of this Agreement must provide the required coverage and must not be suspended, voided or canceled except after 30 Days prior written notice has been given to the City, except when cancellation is for non-payment of premium, then 10 Days prior notice may be given. Such notice must be sent directly to Chandler Law-Risk Management Department, Post Office Box 4008, Mailstop 628, Chandler, Arizona 85225. If any insurance company refuses to provide the require notice, the Contractor or its insurance broker must notify the City of any cancellation, suspension, non-renewal of any insurance within 7 Days of receipt of insurers' notification to that effect.
- 11.3.10 City as Additional Insured. The above-referenced policies are to contain, or be endorsed to contain, the following provisions:
  - 11.3.10.1 The Commercial General Liability and Automobile Liability policies are to contain, or be endorsed to contain, the following provisions: The City, its officers, officials, agents, and employees are additional insureds with respect to liability arising out of activities performed by, or on behalf of, the Contractor including the City's general supervision of the Contractor; Products and Completed Operations of the Contractor; and automobiles owned, leased, hired, or borrowed by the Contractor.
  - 11.3.10.2 The City, its officers, officials, agents, and employees must be additional insureds to the full limits of liability purchased by the Contractor even if those limits of liability are in excess of those required by this Agreement.
- 11.4 **BONDS AND OTHER PERFORMANCE SECURITY**
- 11.4.1 After Agreement award, Contractor must provide a Performance Bond and a Payment Bond, each in an amount equal to the full amount of the Agreement Price.
- 11.4.2 Each such bond must be executed by a surety company or companies holding a Certificate



of Authority to transact surety business in the State of Arizona, issued by the Director of the Arizona Department of Insurance and must be named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff Bureau of Accounts, U.S. Treasury Department. A copy of the Certificate of Authority must accompany the bonds. The Certificate must have been issued or updated within two (2) years prior to the execution of this Agreement. The bonds must be written or countersigned by an authorized representative of the surety who is either a resident of the state of Arizona or whose principal office is maintained in this state, as by law required.

- 11.4.3 The bonds must be made payable and be acceptable to City. The bond forms for the performance and payment bonds must be in the forms required under A.R.S. § 34-221, *et. Seq.*, as in Appendices 4 and 5 of these General Conditions.
- 11.4.4 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Agreement Documents, Contractor must promptly furnish a copy of the bonds or must permit a copy to be made.
- 11.4.5 All bonds submitted for this Project must be provided by a company which has been rated AM Best rating of A- or better for the prior four quarters by the latest edition of the 'Results Best's Key Rating Guide (Property/Casualty)' published by the A.M. Best Company.
- 11.4.6 Personal or individual bonds are not acceptable.
- 11.4.7 If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent, or Contractor's right to do business is terminated in any state where any part of the Project is located, or it ceases to meet the requirements of this Section 11.4, Contractor must within 5 Days thereafter substitute another Bond and surety, both of which must be acceptable to City.

## **SECTION 12 - INDEMNIFICATION**

- 12.1 To the extent permitted by law, the Contractor and its owners, officers, directors, agents, employees, and subconsultants (collectively "Indemnitor") must indemnify, save, and hold harmless the City and its officers, officials, agents, and employees (collectively "Indemnitee") from any and all claims, actions, liabilities, damages, losses, or expenses (including court costs, attorneys' fees, and costs of claim processing, investigation, and litigation) (collectively "Claims") caused or alleged to be caused, in whole or in part, by the negligent, reckless, wrongful, or willful acts, errors, or omissions of Indemnitor in connection with this Agreement. This indemnity includes any Claim or amount arising out of or recovered under workers' compensation laws or on account of Indemnitor's failure to conform to any federal, state, or local law, statute, ordinance, rule, regulation, or court decree. Indemnitor must indemnify Indemnitee from and against any and all Claims, except those arising solely from Indemnitee's own negligent, reckless, wrongful, or willful acts, errors, or omissions. Indemnitor is responsible for primary loss investigation, defense, and judgment costs where this indemnification applies. In consideration of the award of this Agreement, Indemnitor agrees to waive all rights of subrogation against Indemnitee for losses arising from or related to this Agreement. Indemnitor's obligations under this provision survive the termination or expiration of this Agreement.

## **SECTION 13 -DISPUTE RESOLUTION**

- 13.1 All disputes arising out of or relating to the Agreement, the Work or the Project, other than termination under Section 10, will be resolved pursuant to the Dispute Resolution process set forth in Appendix 6 of these General Conditions, and not pursuant to MAG Specifications § 110.
- 13.2 Contractor agrees that during any dispute between the parties, Contractor will continue to perform its obligations under the Agreement until such dispute is resolved.
- 13.3 Notwithstanding any other provision in this Agreement, City has the right to immediately file in court and pursue an action for a temporary restraining order and injunctive relief against Contractor if City determines that such action is necessary to protect its interests under the Agreement, to obtain specific performance of any provision of the Agreement, to advance the completion of the Project, or to protect health, welfare and safety.

## **SECTION 14 - MISCELLANEOUS PROVISIONS**

### **14.1 AGREEMENT DOCUMENTS**

- 14.1.1 The Agreement Documents are intended to permit the parties to complete the Work and all obligations required by the Agreement Documents within the Agreement Times for the Agreement Price. The Agreement Documents are intended to be complementary and interpreted in harmony so as to avoid conflict, with words and phrases interpreted in a manner consistent with construction and design industry standards.
- 14.1.2 It is the intent of the Agreement Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Agreement Documents. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Agreement Documents or from prevailing custom or trade usage as being required to produce the intended result must be provided by Contractor whether or not specifically called for at no additional cost to City.
- 14.1.3 The Agreement Documents establish the rights and obligations of the parties and include the Agreement, Addenda (which pertain to the Agreement Documents), Contractor's Bid or Proposal (including documentation accompanying the Bid and any post-Bid documentation submitted prior to Agreement award) when attached as an exhibit to the Agreement, the accepted Project Schedule, the Notice to Proceed, the Performance Bond, the Payment Bond, Project Design, Engineering and Specifications, these General Conditions, the Project Specific Special Provisions, Technical Specifications, Agreement Drawings, as the same may be more specifically identified in the Agreement, Change Orders, Work Change Directives, Field Orders and the written interpretations and clarifications of the Design Professional or City representative and Modifications issued after execution of the Agreement. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Agreement Documents.
- 14.1.4 In the event of any inconsistency, conflict, or ambiguity between or among the Agreement Documents, the Agreement Documents will take precedence as follows from highest to lowest: Change Orders, Addenda, Agreement, Project Specific Special Provisions, General Conditions, Technical Specifications, Drawings/Plans, Chandler Amendments to MAG Standard Specifications and Chandler Standard Details, and MAG Uniform Standard Specifications and Details for Public Works Construction. If applicable to this Agreement, Federal Provisions prevail.

- 14.1.5 On the Drawings, given dimensions will take precedence over scaled measurements and large scale drawings over small-scale drawings.
- 14.1.6 Clarifications and interpretations of the Agreement Documents will be issued by the Design Professional through the City.
- 14.1.7 The headings used in this Agreement or any other Agreement Documents, are for ease of reference only and must not in any way be construed to limit or alter the meaning of any provision.
- 14.1.8 The Agreement Documents form the entire agreement between City and Contractor. No oral representations or other agreements have been made by the parties except as specifically stated in the Agreement Documents.
- 14.1.9 The Agreement Documents may not be changed, altered, or amended in any way except in writing signed by a duly authorized representative of each party in the form of a Change Order.
- 14.1.10 Re-Use of Documents. Neither Contractor nor any Subcontractor, manufacturer, fabricator, supplier or distributor will have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of the Design Professional; and they must not re-use any of them on extensions of the Project or any other project without written consent of City and the Design Professional and specific written verification or adaptation by the Design Professional.
- 14.2 **REFERENCE STANDARDS**
  - 14.2.1 Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, will mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Agreement Documents.
  - 14.2.2 The provisions of any such standard, specification, manual or code, or any instruction of a Supplier will not change the duties or responsibilities of City, Contractor, Design Professional or Project Manager, or any of their Subcontractors, consultants, agents, or employees from those set forth in the Agreement Documents, nor will any such provision or instruction assign to City, Contractor, Design Professional, or any of their agents, or employees any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Agreement Documents.
- 14.3 **COMPLIANCE WITH ARIZONA LAW AND FEDERAL LAW**
  - 14.3.1 Compliance with A.R.S. § 41-4401. Pursuant to the provisions of A.R.S. § 41-4401, the Contractor hereby warrants to the City that the Contractor and each of its subcontractors ("Subcontractors") must comply with all Federal Immigration laws and regulations that relate to the immigration status of their employees and the requirement to use E-Verify set forth in A.R.S. §23-214(A).
  - 14.3.2 A breach of the Contractor Immigration Warranty constitutes a material breach of this Agreement and subject to penalties up to and including termination of this Agreement.

14.3.3 The City retains the legal right to inspect the papers of any Contractor or Subcontractor employee who works on this Agreement to ensure that the Contractor or Subcontractor is complying with the Contractor Immigration Warranty. The Contractor agrees to assist the City in the conduct of any such inspections.

14.3.4 The City may, at its sole discretion, conduct random verifications of the employment records of the Contractor and any Subcontractors to ensure compliance with Contractors Immigration Warranty. The Contractor agrees to assist the City in performing any such random verifications.

14.3.5 The provisions of this Article must be included in any agreement the Contractor enters into with any and all of its subcontractors who provide services under this Agreement or any subcontract. "Services" are defined as furnishing labor, time or effort in the State of Arizona by a contractor or subcontractor. Services include construction or maintenance of any structure, building or transportation facility or improvement to real property.

#### 14.4 **HAZARDOUS ENVIRONMENTAL CONDITIONS**

14.4.1 Contractor will not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Agreement Document to be within the scope of the Work. Contractor will be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

14.4.2 If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition. Contractor must immediately:

- a. Secure or otherwise isolate such condition;
- b. Stop all Work in connection with such condition and in any area affected thereby; and
- c. Notify City and promptly thereafter confirm such notice in writing.

14.4.3 City will promptly retain a qualified expert to evaluate such condition or take corrective action, if any.

14.4.4 Contractor will be responsible for any and all civil or criminal penalties, fines, damages, or other charges imposed by any regulatory agency or court for sewage discharges that are in violation of applicable statutes and laws and that are a result, direct or indirect, of work performed under this Agreement. Contractor will also be responsible for reimbursement to City for administration, reporting, and tracking expenses required as a result of any spill event. In the event the regulatory agency or court imposes a probationary period, Contractor must post bond for the probationary period to ensure that all such costs are reimbursed to City. This responsibility will apply whether penalties are imposed directly on Contractor or any of its Subcontractors, or the City of Chandler. Contractor must defend and indemnify City against such penalties. Regulatory agencies may include, but are not limited to, the Arizona Department of Environmental Quality (ADEQ) and the United States Environmental Protection Agency (USEPA).

#### 14.5 **COOPERATION AND FURTHER DOCUMENTATION**

Contractor agrees to provide City such other duly executed documents as may be reasonably requested by City to implement the intent of the Agreement Documents.

14.6 **ASSIGNMENT**

Neither Contractor nor City will, without the written consent of the other assign, transfer or sublet any portion of this Agreement or part of the Work or the obligations required by the Agreement Documents, any such assignment will be void, will transfer no rights to the purported assignee, and would be a material breach of the Agreement.

14.7 **SUCCESSORS**

Contractor and City intend that the provisions of the Agreement Documents are binding upon the parties, their employees, agents, heirs, successors and assigns.

14.8 **LAWFUL PRESENCE**

Pursuant to A.R.S. §§ 1-501 and 1-502, City is prohibited from awarding an agreement to any natural person who cannot establish that such person is lawfully present in the United States. To establish lawful presence, a person must produce qualifying identification and sign a City-provided affidavit affirming the identification provided is genuine. This requirement will be imposed at the time of agreement award. This requirement does not apply to business organizations such as corporations, partnerships, or limited liability companies.

14.9 **NO BOYCOTT OF ISRAEL CERTIFICATION**

By Contractor's signature on this Agreement, Contractor certifies under A.R.S. § 35-393.01 that Contractor is not currently engaged in and for the duration of this Agreement will not engage in a boycott of Israel.

14.10 **NO THIRD PARTY BENEFICIARY**

Nothing under the Agreement Documents will be construed to give any rights or benefits in the Agreement Documents to anyone other than City and Contractor, and all duties and responsibilities undertaken pursuant to the Agreement Documents will be for the sole and exclusive benefit of City and Contractor and not for the benefit of any other party, unless otherwise expressly set forth in the Agreement Documents.

14.11 **GOVERNING LAW AND VENUE**

The Agreement and all Agreement Documents will be deemed to be made under, and will be construed in accordance with and governed by the laws of the State of Arizona without regard to the conflicts or choice of law provisions thereof. Any court action to enforce any provision of the Agreement or to obtain any remedy with respect hereto must be brought in the Superior Court, Maricopa County, Arizona, and for this purpose, each party hereby expressly and irrevocably consents to the jurisdiction and venue of such Court.

14.12 **SEVERABILITY**

If any provision of the Agreement Documents or the application thereof to any person or circumstance will be invalid, illegal or unenforceable to any extent, the remainder of the affected provision, the remainder of the Agreement Documents, and the application thereof will not be affected and will be enforceable to the fullest extent permitted by law.

14.13 **LEGAL REQUIREMENTS**

At all times relevant to its entry into this Agreement and performance of the Services and the Work, Contractor must fully comply with all Laws, Regulations, or Legal Requirements applicable to City, the Project, and the Agreement, including, without limitation, those set

forth on Exhibit C of the Agreement.

14.14 **PARTIAL INVALIDITY**

If any provision of the Agreement is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remaining provisions will nevertheless continue in full force without being impaired or invalidated in any way.

14.15 **ATTORNEYS' FEES**

Should either party to the Agreement bring an action to enforce any provision of the Agreement, the prevailing party will be entitled to recover reasonable attorneys' fees and costs in connection therewith.

14.16 **CONFLICT OF INTEREST**

14.16.1 Contractor agrees to disclose any financial or economic interest with the Project property, or any property affected by the Project, existing prior to the execution of the Agreement. Further, Contractor agrees to disclose any financial or economic interest with the Project property, or any property affected by the Project, if Contractor gains such interest during the course of this Agreement. If Contractor gains financial or economic interest in the Project during the course of this Agreement, this may be grounds for terminating this Agreement. Any decision to terminate the Agreement must be at the sole discretion of City.

14.16.2 Contractor will not engage the services on this Agreement of any present City employee who was involved as a decision maker in the selection or approval processes, or who negotiated or approved billings or Agreement Modifications for this Agreement.

14.16.3 Contractor agrees that it will not perform services on this Project for a contractor, subcontractor, or any supplier, not covered under this Agreement.

14.17 **INDEPENDENT CONTRACTOR**

Contractor is and must be an independent contractor. Any provisions in the Agreement Documents that may appear to give City the right to direct Contractor as to the details of accomplishing the Work or to exercise a measure of control over the Work means that Contractor must follow the wishes of City as the results of the Work only. These results must comply with all applicable laws and ordinances.

14.18 **NOTICE OF INJURY**

Should City or Contractor suffer injury or damage to their person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim must be made in writing to the other party within 7 Days of the first observance of such injury or damage.

14.19 **CONFIDENTIALITY**

Contractor, for the benefit of City, hereby agrees it will not release or cause or permit to be released to the public any press notices, publicity (oral or written) or advertising promotion relating to, any statement regarding, or any other public announcement or disclosure or cause or permit to be publicly announced or disclosed, in any manner whatsoever, the specific terms and conditions of this Agreement or any comment relating to the Project or the Site. Notwithstanding the foregoing, Contractor will be entitled to disclose the terms of the Agreement to the extent required by law or in the course of enforcing or defending a claim or action hereunder. Contractor must give City reasonably prompt notice of any disclosure or statement made pursuant to this provision.

14.20      **DATA CONFIDENTIALITY**

- 14.20.1      As used in the Agreement, "data" means all information, whether written or verbal, including plans, specifications, renderings, photographs, studies, investigations, audits, analyses, samples, reports, calculations, internal memos, meeting minutes, data field notes, work product, proposals, correspondence and any other similar documents or information prepared by, obtained by, or transmitted to the City in the performance of this Agreement.
- 14.20.2      Contractor agrees that all data, regardless of form, including originals, images, and reproductions, prepared by, obtained by, or transmitted to City in connection with the Contractor's performance of this Agreement is confidential and proprietary information belonging to City.
- 14.20.3      Except as specifically provided in this Agreement, Contractor or its Subcontractors must not divulge data to any third party without prior written consent of City. Contractor or its Subcontractors must not use data for any purposes except to perform Work required under this Agreement. These prohibitions will not apply to the following data provided Contractor has first given the required notice to City:
- a. Data which was known to Contractor or its Subcontractors prior to its performance under this Agreement unless such data was acquired in connection with Work performed for City;
  - b. Data which was acquired by Contractor or its Subcontractors in its performance under this Agreement and which was disclosed to Contractor or its Subcontractors by a third party, who to the best of Contractor's or its Subcontractor's knowledge and belief, had the legal right to make such disclosure and Contractor or its Subcontractors are not otherwise required to hold such data in confidence; or
  - c. Data which is required to be disclosed by virtue of law, regulation, or court order, to which the Contractor or its Subcontractors are subject.
- 14.20.4      In the event the Contractor or its Subcontractors are required or requested to disclose data to a third party, or any other information to which the Contractor or its Subcontractors became privy as a result of any other agreement with City, the Contractor must first notify City as set forth in this Section of the request or demand for the data. The Contractor or its Subcontractors must give City sufficient facts so that City can be given an opportunity to first give its consent or take such action that City may deem appropriate to protect such data or other information from disclosure.
- 14.20.5      Unless prohibited by law, within 10 Days after completion of services for a third party on real or personal property owned or leased by City, the Contractor must promptly deliver, as set forth in this Section, a copy of all data to City. All data will continue to be subject to the confidentiality agreements of this Agreement.
- 14.20.6      Contractor or its Subcontractors assume all liability for maintaining the confidentiality of the data in its possession and agree to compensate City if any of the provisions of this Section are violated by Contractor, its employees, agents, or Subcontractors. Solely for the purposes of seeking injunctive relief, it is agreed that a breach of this Section will be deemed to cause irreparable harm that justified injunctive relief in court. Contractor agrees that the requirements of this Section will be incorporated into all subcontracts entered into by Contractor. A violation of this Section may result in immediate termination of this

Agreement without notice.

14.21 **SURVIVAL**

All warranties, representations and indemnifications by Contractor must survive the completion or termination of this Agreement.

14.22 **COVENANTS AGAINST CONTINGENT FEES**

Contractor warrants that no person has been employed or retained to solicit or secure this Agreement upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, and that no member of City Council, or any employee of City has any interest, financially, or otherwise, in the firm. For breach or violation of this warrant, City will have the right to annul the Agreement without liability or at its discretion to deduct from the Agreement Price or consideration, the full amount of such commission, percentage, brokerage, or contingent fee.

14.23 **NO WAIVER**

The failure of either party to enforce any of the provisions of the Agreement Documents or to require performance of the other party of any of the provisions hereof must not be construed to be a waiver of such provisions, nor will it affect the validity of the Agreement Documents or any part thereof, or the right of either party to thereafter enforce each and every provision.

14.24 **NONEXCLUSIVE REMEDIES**

The remedies set forth in this Agreement are cumulative and not exclusive, and failure to exercise any remedy (including, without limitation, any right to terminate) will not preclude any party from exercising any other right in seeking any other remedy available to it at law or in equity.

14.25 **PROJECT COMMUNICATIONS**

14.25.1 All communications concerning the performance of the Work or the Project will be provided to the designated Project Manager and Contractor's Representative set forth in Article 1 of the Agreement. City may change the designated Project Manager and, subject to Section 4.4.20 of these General Conditions, Contractor may change Contractor Representative, by written notice to the other.

14.25.2 Project communications may be exchanged by e-mail, but email communications cannot change the terms of the Agreement or the Scope of Work, or effectuate any change that requires a written Change Order.

14.25.3 When any provisions of the Agreement Documents requires Contractor or the Design Professional to give written notice to City, it will be deemed to have been validly given if delivered in person or if delivered at or sent by registered or certified mail, postage prepaid, to the Parties indicated in Agreement Article 1, incorporated by reference.

14.25.4 When any provisions of the Agreement Documents requires City, Project Manager, or the Design Professional to give written notice to Contractor, it will be deemed to have been validly given if delivered in person to the person designated in the Agreement Documents as Contractor's Resident Superintendent, or if delivered at or sent by registered or certified mail, postage prepaid, to Contractor at the last address in the Agreement Documents or such substitute address which Contractor designates in writing, or to the business address known to the giver of notice.



14.26 **DRUG FREE WORKPLACE PROGRAM**

14.26.1 City has adopted a policy establishing a drug free workplace for itself and as a requirement for Contractors doing business with City, to ensure the safety and health of employees working on City projects.

14.26.2 Contractor must require a drug free workplace for all employees working under the Agreement. Specifically, all employees of Contractor who are working under an agreement with City must be notified, in writing, by Contractor that they are prohibited from the manufacture, distribution, dispensation, possession or unlawful use of a controlled substance in the workplace.

14.27 Failure to require a drug free workplace in accordance with the City's policy may result in termination of the Agreement and possible debarment from bidding on future City projects.

**SECTION 15 - PROVISIONS APPLICABLE SOLELY TO GMP AND COST-BASED AGREEMENTS, CHANGE ORDERS, AND JOB ORDERS**

15.1 **ADDITIONAL DEFINITIONS**

The definitions set forth in Section 2 apply to GMP and Cost-Based Agreements, Change Orders, and Job Orders, together with the additional definitions set forth below.

Baseline Cost Model –

A breakdown and estimate of the scope of the Project developed by CM@Risk pursuant to Section 17.5 of these General Conditions.

CM@Risk or Construction Manager at Risk –

The person or firm selected by City to provide pre-construction and/or construction services as detailed in a Construction Manager at Risk Agreement with City. In these General Conditions, the term "Contractor" includes CM@Risk under both Pre-Construction and Construction Services Agreements.

CM@Risk Fee or Contractor's Fee –

An agreed to percentage in an accepted GMP that represents the Contractor's fee for performance of the Work.

Agreement Documents –

Where compensation under the Agreement is based upon a GMP accepted by City, the term "Agreement Documents" also includes the accepted GMP Proposal.

Agreement Price –

Where compensation under the Agreement based upon a GMP accepted by City, the term "Agreement Price" refers to the GMP.

Cost-Based Agreement, Change Order, or Job Order –

A Agreement, Change Order, or Job Order where the Agreement Price is based upon the actual cost of performing the Work, subject to the terms of the Agreement Documents, including this Section 15. These would include those generally referred to as "Cost of the Work plus a Fee with a GMP," "Time and Materials," or "Cost Plus a Fee."

Cost of the Work –

The direct costs necessarily incurred by Contractor in the proper, timely, and complete performance on the Work. The Cost of the Work will include only those costs set forth in Section 15.2 of these

General Conditions.

Deliverables –

The work products prepared by Contractor in performing the scope of work described in the Agreement. Some of the major deliverables to be prepared and provided by Contractor during pre-construction may include but are not limited to: the Baseline Cost Model and Schedule that validate City's plan and budget, Construction Management Plan, Detailed Project Schedule, Schedule of Values, alternative system evaluations, procurement strategies and plans, Detailed Cost Estimates, construction market surveys, cash flow projections, GMP Proposals, Subcontractor procurement plan, Subcontractor agreements, Subcontractor bid packages, Supplier agreements, Constructability Review, Cost Control Log, Traffic control and phasing plans and others as indicated in this Agreement or required by the Project Team.

Pre-Construction Services Agreement –

The Agreement entered into between City and the CM@Risk for Pre-Construction Services to be provided by the CM@Risk, including, without limitation, the generation of a GMP Proposal. If the GMP Proposal is accepted by City and a Construction Agreement is entered into between City and CM@Risk, the duties, obligations and warranties of the CM@Risk under the Pre-Construction Services Agreement survive and are incorporated into the resulting Construction Agreement.

Pre-Construction Services –

The services to be provided under the Pre-Construction Services Agreement, including Section 17 of these General Conditions.

Detailed Project Schedule –

The Detailed Project Schedule developed by the CM@Risk for the review and approval of the Project Manager in accordance with Section 17.3 of these General Conditions, if applicable.

General Conditions Costs –

Those costs set forth in Section 4 of Appendix 9 to these General Conditions.

GMP Plans and Specifications –

The plan and specifications upon which the Guaranteed Maximum price Proposal is based.

GMP Proposal –

The proposal of Contractor submitted pursuant to Section 17.7 of these General Conditions for the entire Work and/or portion (phases) of the Work.

Guaranteed Maximum Price or GMP –

The Guaranteed Maximum Price set forth in the Agreement, Change Order, or Job Order if applicable.

**15.2      AGREEMENT PRICE**

15.2.1      The Agreement Price for all Agreements, Change Orders, and Job Orders based upon payment of the Cost of the Work plus a Fee with a GMP, time and materials, or cost-plus a fee will be the Cost of the Work incurred plus the Fee agreed to in writing by City, limited to the amount of the GMP, if agreed to. Unless otherwise expressly provided in the Agreement, Change Order, or Job Order, all Cost Based pricing will be subject to and limited to GMP.

15.2.2      The Agreement Price may only be changed as set forth in Section 9 above.

15.2.3 Only costs specifically designated as reimbursable costs are eligible for payment by City or may be charged against the Agreement Price. All other costs will not be paid by City and will not be chargeable against the Agreement Price.

15.2.4 Cost-Based Agreements. For Agreements, Change Orders, or Job Orders, reimbursable costs must be determined pursuant to Appendix 9 to these General Conditions, Cost of the Work, and not by MAG Specifications §109.5.

15.3 **ALLOWANCES**

15.3.1 Contractor must include in the Agreement Price all Allowances stated in the Agreement Documents and agreed to in writing by City. Items covered by these Allowances must be supplied for such amounts and by such persons as City may direct, provided Contractor will not be required to employ persons against whom Contractor makes a reasonable objection. Materials, labor, and equipment under an Allowance will be selected by City in accordance with a schedule to be mutually agreed upon by City, Design Professional and Contractor or otherwise in reasonably sufficient time to avoid delay in the Work.

15.3.2 Unless otherwise provided in the Agreement Documents:

15.3.2.1 These Allowances must cover the cost to Contractor, less any applicable trade discount, of the materials, labor, and equipment required by the Allowances, delivered at the Site, and all applicable taxes;

15.3.2.2 Contractor's costs for unloading and handling on the Site, labor, installation costs, overhead, profit and other expenses relating to materials, labor, and equipment required by the Allowance must be included in the Agreement Sum and not in the Allowance; and

15.3.2.3 Whenever the cost is more or less than the Allowance, the Agreement Sum must be adjusted accordingly by Change Order, the amount of which will recognize the difference between actual costs for an Allowance item and the amount of the Allowance item and changes, if any, in handling costs on the Site, labor, installation costs, overhead, profit and other expenses.

15.4 **CONTINGENCY**

An agreed to amount in the GMP that may only be used in accordance with the terms set forth in these General Conditions and with prior written approval by the City.

15.4.1 Construction Contingency. This GMP includes a dollar amount listed as a Construction Contingency which will be readily available for increased costs for subcontractors, material, and equipment subject to prior approval of City, which approval will not be withheld unreasonably. The Construction Contingency may also be used, at the discretion of City, to reimburse CM@Risk for unexpected costs due to (a) scope gaps between trade subcontractors; (b) agreement default by trade subcontractors; (c) unforeseen field conditions, but only as defined in Section 9.5 above; (d) work completed to meet the intent of the design, but which was not indicated on the plans; (e) costs overruns not covered by allowances; (f) costs of corrective work not provided for elsewhere; and (g) implementation of any Recovery Plan. Cost for which CM@Risk desires to be paid from the Construction Contingency must be documented by CM@Risk on a time and materials basis and are subject to verification by City. If agreed to by City, a "Use of Contingency" form will be executed by both parties authorizing the actual cost of the work to be paid and included in the Work Item Direct Costs. The Construction Contingency is not allocated to any particular

item of the Project but may be used for any portion of the work as determined above. Any amount not used in the Construction Contingency will belong to City and will reduce the GMP.

- 15.4.2 **Owner's Contingency.** This GMP also includes a dollar amount listed as an Owner's Contingency which may be used only by the City (owner department) for upgrades and changes in scope or other changes not already included within the intent of the Project Program. City will provide CM@Risk with a Work Change Directive authorizing CM@Risk to perform the additional work and to transfer funds from the Owner's Contingency to the Work Item Direct Costs category to be paid with such direct costs. These additional costs will be in an amount mutually agreed upon by CM@Risk and City or will be documented by CM@Risk on a time and materials basis and are subject to verification by City. Any amount not used in the Owner's Contingency will belong to the City and will reduce the GMP.

15.5 **REDUCTION IN RETENTION**

If the Agreement Price is based upon a GMP, in order to receive payment of one-half of the retention as set forth in Section 8.1.5 above, Contractor must also submit to the Project Manager a complete accounting of the Actual Reimbursable Cost of the Work to date, including all such documentation (including, without limitation, invoices, subcontract, subcontractor change orders, purchase orders, records of payment, etc.) as City may require, to establish whether the payments made to Contractor equal, exceed, or are less than the actual reimbursable Cost of the Work to date. Any excess payments by City, as determined by the Project Manager, will be deducted from the one-half retention payment to be made to Contractor, and any additional excess amounts paid to Contractor will be refunded by Contractor to City. The Project Manager's determinations as to Actual Reimbursable Cost of the Work will be the basis of payment until final Project Closeout and Final Payment under the Agreement.

15.6 **FINAL PAYMENT**

If the Agreement Price is based upon a GMP, as a further condition precedent to Final Payment by City, Contractor must submit to the Project Manager a complete final accounting of the Actual Reimbursable Cost of the Work, including all such documentation (including, without limitation, invoices, subcontracts, subcontractor change orders, purchase orders, records of payment, etc.) as City may require, to establish whether the payments made to Contractor equal, exceed, or are less than the Actual Reimbursable Cost of the Work to date. Any excess payments by City, as determined by the Project Manager, will be deducted from the one-half retention payment to be made to Contractor, and any additional excess amounts paid to Contractor will be refunded by Contractor to City. Disputes relating to the Final Cost of the Work will be subject to City's audit rights under Sections 8.8 above and 15.7 below, and the dispute resolution process under Section 13 above.

15.7 **OPEN BOOK**

On any GMP-based or Cost-Based Agreement, Job Order, or Change Order, City may attend any and all meetings or discussions pertaining to the Project, including bid openings, and must have access to all books, invoices, accounts, memoranda, correspondence, and written communications or records of any kind pertaining to the Project, including without limitation, those stored in electronic format.

15.8 **DIFFERING SITE CONDITIONS AND/OR CHANGE IN LAWS**

A Change Order for increased costs under Section 9.5 or 9.6 above will only be considered

or granted by City to the extent such actual, documented costs are justified.

## **SECTION 16 - PROVISIONS APPLICABLE SOLELY TO JOB ORDER AGREEMENTS (JOC)**

### **16.1 ADDITIONAL DEFINITIONS**

The definitions set forth in Sections 2 and below will apply to all Job Order Agreements and Job Orders. In addition, the definitions set forth in Section 15.1 above will apply to all Cost-Based Job Orders.

#### Agreement –

Includes the Job Order Master Agreement and Job Order Project Agreements issued and agreed to by City and JOC Contractor.

#### JOC Contractor's Coefficient –

A numerical factor that represents JOC Contractor total costs (indirect and direct costs, sales tax, profit, etc.) and other adjustments for market conditions.

#### Job Order Request for Proposal (RFP) –

The Request for Proposals issued by City for each Job Order Project Agreement relating to a specific Project.

#### Job Order Cost Proposal –

The Proposal submitted by JOC Contractor in response to a Job Order Request for Proposal (RFP) issued by City to develop a Job Order Project Agreement for a specific Project.

#### Guaranteed Maximum Price (GMP) Job Order –

Job Order under which JOC Contractor is compensated for actual costs incurred.

#### Job Order Project Agreement (Job Order) –

The agreement for a specific project, as it may be modified by all Change Orders, executed by the Parties, which incorporates the terms and conditions of the Job Order Master Agreement.

### **16.2 ORDERING AND PROCESSING PROCEDURES FOR JOB ORDERS**

16.2.1 The process for developing and issuing a Job Order for a particular Project consists of three (3) procedures: (1) issuance of a RFP by City; (2) JOC Contractor's response to the RFP in the form of JOC Contractor's Job Order Cost Proposal; and (3) Issuance of a Job Order by City, as set for below.

#### **16.2.2 RFP's For Job Orders**

16.2.2.1 City will provide to JOC Contractor RFP with a Scope of Work (SOW) describing the Work to be performed, which may include special instructions and conditions, material submittal requirements, and, if applicable, a complete set of sketches, construction drawings and specifications for the Job Order.

16.2.2.2 Some Job Order RFP's will be issued by City without detailed sketches, drawing and specifications and will rely on JOC Contractor to produce them for City review and approval and is considered to be Pre-Construction and incidental design services included in JOC Contractor's overhead for GMP Job Orders. In addition JOC Contractor will not be reimbursed for any Pre-Job Order costs, including proposal preparation, attendance during negotiations, or site visits.

16.2.3 JOC Contractor's Job Order Cost Proposal

16.2.3.1 JOC Contractor must respond within ten (10) calendar days of the RFP date or site visit, whichever is later or as otherwise indicated on a case-by-case basis, by submitting JOC Contractor's Job Order Cost Proposal to the City representative.

16.2.3.2 Unless otherwise required under the terms of the RFP, JOC Contractor's Job Order Cost Proposal must include the following.

- a. JOC Contractor's Job Order Cost Proposal in PDF and electronic format;
- b. A Project Schedule and schedule of values that reflects the costs of each work element on the schedule. The schedule must show all milestones (e.g., permits, submittals, ordering materials, demolition, work phases, closeout and completion date); and
- c. Necessary documentation will be required to indicate that adequate scoping, layout, setup and planning to accomplish the Work has been done. Examples of documentation that might reasonably be expected include sketches, drawings, calculations, catalog cuts and specifications produced to a level of detail and skill that could be expected of experienced, competent Project Managers with five or more periods experience in their respective trade.

16.2.3.3 JOC Contractor must select Subcontractors based on qualifications alone or on a combination of qualifications and price and must not select Subcontractors based on price alone. A qualifications and price selection may be a one-step selection based on a combination of qualifications and price or two-step selection. In a two-step selection, the first step must be based on qualifications alone and the second step may be based on a combination of qualifications and price or on price alone.

16.2.3.4 Upon request, JOC Contractor must provide City with copies of Subcontractor quotes and the basis for selection of each Subcontractor.

16.2.3.5 If City objects to a selected Subcontractor, City will make the objection and the reasons for the objection known to the JOC Contractor. JOC Contractor must then present an acceptable Subcontractor for the applicable discipline. City will not unreasonably object to or withhold approval of a Subcontractor.

16.2.3.6 For self-performed work, the City retains the right to have the JOC Contractor establish JOC Contractor's costs by bidding their costs against at least three (3) other interested trade Contractors. No self-performed work will be allowed to be performed on a lump sum basis.

16.2.4 Issuance of Job Order

16.2.4.1 City Representative will compare the JOC Contractor's Job Order Cost Proposal with the City's estimate, schedules and other requirements, and then, if the City Representative determines it is in the best interest of City, arrange a meeting with JOC Contractor, at which time the JOC Contractor's Job Order Cost Proposal will be discussed and negotiated.

16.2.4.2 If the City Representative determines that it is in the best interest of the City, City will then issue a Job Order to JOC Contractor for execution.

16.2.4.3 Specific Job Orders may vary, but unless agreed to by City in writing otherwise, the content

of Job Orders under the Agreement will generally be as follow, all of which will be signed and/or initialed by JOC Contractor's designated representative:

- a. The description of the Scope of the Work and Project Schedule (attached as Exhibit A to the Job Order);
- b. The address or location of the Work;
- c. The Agreement Price for Work (Construction) included in the Project (attached as Exhibit B to the Job Order);
- d. The name of the JOC Contractor representative for the Project;
- e. The Drawings and Specifications for the Project;
- f. If any shop drawings, project date and/or samples are required for the Job Order, the date for delivery of each required item (included in the Project Schedule, Exhibit A to the Job order); and
- g. Project Specific Provisions, if any, in Exhibit A to the Job Order, including, without limitation, whether any of the following are required: Pre-Construction Conference, weekly progress meetings, field office, storage enclosure, materials and equipment handling facility, submittals, shop drawings, product data, equipment list, samples, project manual, schedule of values, Construction progress schedule, narrative reports, progress report, progress charts, progress photographs, materials status report, Construction diagram, Construction status report, operation and maintenance data, operating maintenance instructions and parts list, and as-build drawings.

16.2.5 Job Order Intent. Each Job Order will be interpreted to include all items reasonably necessary to complete the Project under that Job Order as described in the scope of the Work in that Job Order. All Work must be performed in a professional manner and all materials used must be new and of the highest quality and of the type best adapted to their purpose, unless otherwise specified. The Notice to Proceed date, and the award date established therein, will be deemed an integral part of the Job Order the same as if set forth therein.

### 16.3 **INCIDENTAL DESIGN SERVICES**

16.3.1 This effort includes all "extensions of design" for systems that are typically specified in a performance oriented manner by consultants and designers. Examples include: fire sprinkler systems, fire alarm and sprinkler systems, DDC controls, control systems, prefabricated metal building and similar situations. These designs are normally provided under submittals as a shop drawing with engineering backup and as appropriate, seals of registered engineers specializing in the particular system.

16.3.2 Incidental design includes all documents, sketches, schematic diagrams, floor plan layouts, equipment schedules and other documents produced by the JOC Contractor to define the work required for projects that the City does not develop formal or abbreviated designs requiring a seal by a registered engineer. Incidental design does not include preparation of designs requiring an architect or engineer seal.

16.3.3 JOC Contractor represents, covenants, and agrees, and contractually assumes the obligation to furnish, all of the required Design Services through properly licensed and

experienced Design Professionals in complete accordance with all of the duties imposed on a Design Professional under the Agreement Documents, Laws, Regulations, or Legal Requirements, and the common law.

- 16.3.4 All Design Documents (and all other Project-related documents, models, computer drawings and other electronic expression, photographs and other expressions CADD, and BIM files and images included) that JOC Contractor and/or JOC Contractor's Design Professional(s) prepare in connection with a Job Order and the copyrights therein (collectively, the "Instruments of Service") will be the property of City. JOC Contractor covenants and agrees to execute any additional document reasonably requested by City to confirm such assignment without any additional compensation.

16.4 **CONSTRUCTION SERVICES**

- 16.4.1 The following subsections of this Section 16.4 set forth requirements beyond those set forth in Section 4 above which apply to Construction Services performed under a Job Order.

- 16.4.2 JOC Contractor must perform the Work using only those firms, team members and individuals designated by JOC Contractor consistent with each Job Order or otherwise approved by City pursuant to the General Conditions. No other entities or individuals may be used without the prior written approval of the Project Manager.

16.4.3 Construction Phasing

- 16.4.3.1 City use of the facilities is anticipated while the Work is being performed. The Work must be planned and accomplished so that there will be a minimum of interference and inconvenience to occupants in the building and agencies in the vicinity and to other craftsmen who may have to do work in the affected facilities. Any blockage of building exits or driveways must be coordinated in advance.

- 16.4.3.2 If applicable, furniture, portable office equipment and wall appurtenances not rigidly fastened to the walls must be moved by JOC Contractor, protected from damage and replaced to the original position upon completion of the work. If the work required by the Job Order will not allow furniture and portable office equipment to be replaced to its original position, new locations will be designated by City. Incidental costs associated with moving one-piece furnishings up to approximately 150 pounds to perform such tasks as painting, carpet or tile replacement, etc., are considered a general cost of building renovation and must be included in the JOC Contractor's Coefficient. Costs for large scale or wholesale removal and replacement of large quantities of desks or modular workstations, copiers, multiple full file cabinets, etc. to another location or storage outside the work space, or disassembly and reassembly of modular furniture is not considered part of the JOC Contractor's Coefficient and will be priced separately.

- 16.4.3.3 The work must, so far as practicable, be done in definite sections or divisions and confined to limited areas which must be completed before work in other sections or divisions are begun.

- 16.4.4 Work Site Conflicts. In the event of a conflict between JOC Contractor and others in an occupied facility or where other Contractors are performing work on the same facility under other Agreements, City will decide to dispute and that decision will be final.

- 16.4.5 Ownership of Work Product. Work Product prepared or otherwise created in connection



with the performance of this Agreement, including the Work, are to be and remain the property of City. For purposes of this provision, "Work Product" will include all designs, drawings, plans, specifications, ideas, renderings and other information or matter, in whatever form created (e.g., electronic or printed) and in all media now known or hereinafter created. All Work Product will be considered Work Made for Hire as defined in the United States Copyright Act 17 U.S.C. §101 (Copyright Act). If for any reason any such Work is found not to be a work for hire, JOC Contractor hereby transfers and assigns ownership of the copyright in such Work to City. The rights in this Section are exclusive to City in perpetuity.

16.5 **OPTIONAL LIQUIDATED DAMAGES**

16.5.1 Specific Job Orders. City will have the right to assess liquidated damages in relation to any specific JOC Project Agreement as set forth below.

16.5.2 Substantial Completion Liquidated Damages. JOC Contractor acknowledges and agrees that if JOC Contractor fails to obtain Substantial Completion of the Work within the Agreement Time, City will sustain extensive damages and serious loss as a result of such failure. The exact amount of such damages will be extremely difficult to ascertain. Therefore, City and JOC Contractor agree that if JOC Contractor fails to achieve Substantial Completion of the Work within the Agreement Time, City will be entitled to retain or recover from JOC Contractor, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9.

16.5.3 Final Acceptance Liquidated Damages. For the same reasons set forth in Section 16.5.2 above, City and JOC Contractor further agree that if JOC Contractor fails to achieve Final Acceptance of the Work within the Agreement Time, City will be entitled to retain or recover from JOC Contractor, as liquidated damages and not as a penalty, the sum per calendar day as indicated in MAG § 108.9 commencing from the actual date of Substantial Completion or Final Acceptance as required under any specific JOC Project Agreement.

16.5.4 MAG Liquidated Damages. Liquidated damages provisions in MAG § 108.9 may apply to any specific JOC Project Agreement.

16.5.5 City may deduct liquidated damages assessed pursuant to this Section 16.5 from any unpaid amounts then or thereafter due JOC Contractor under the Agreement or any specific JOC Project Agreement between JOC Contractor and City. Any liquidated damages not so deducted from any unpaid amounts due JOC Contractor must be payable to City at the demand of City, together with interest from the date of the demand at the highest lawful rate of interest payable to JOC Contractor.

16.6 **PERFORMANCE MEASUREMENT**

16.6.1 Performance Assessment. After the Final Acceptance of Work under each Job Order, City will complete a written evaluation of the performance of JOC Contractor on the Job Order.

16.6.2 Consideration in Assignment of Work. JOC Contractor's record of cost, schedule and quality performance and comparative assessments will be significant considerations in City's determination whether to award future Job Orders. JOC Contractor agrees that any determination by City not to award future Job Orders or Option periods based on performance will be at the sole discretion of City.

**SECTION 17 - PROVISIONS APPLICABLE SOLELY TO PRE-CONSTRUCTION SERVICES FOR  
CONSTRUCTION MANAGER AT RISK**

**17.1      ADDITIONAL DEFINITIONS**

The definitions set forth in Section 2 and 15.1 above will apply to all Pre-Construction Services Agreements.

**17.2      GENERAL**

17.2.1      CM@Risk must perform the Services required by, and in accordance with the Agreement Documents and as outlined in Exhibit A of the Agreement to the satisfaction of the Project Manager, exercising the degree of care, skill, diligence and judgment a professional construction manager experienced in the performance of such services for construction and/or facilities of similar scope, function, size, quality, complexity and detail to the Project in urban areas throughout the United States, would exercise at such time, under similar conditions. CM@Risk must, at all times, perform the required services consistent with sound and generally accepted engineering principles and construction management and construction contracting practices.

17.2.2      As a participating member of the Project Team, CM@Risk must provide to City and Design Professional a written evaluation of City's Project Program and budget, each in terms of the other, with recommendations as to the appropriateness of each. CM@Risk must prepare a Baseline Cost Model that validates City's budget. The Baseline Cost Model must include all assumptions and basis of estimates in enough detail so that the Project Team can compare future detail estimates to the Baseline Cost model for variances. City and Design Professional will provide all the reasonably required data that is available in order to reach agreement between the team members that the Baseline Cost Model is an accurate projection of the costs of the Project.

17.2.3      CM@Risk must attend Project Team meetings, which may include, but are not limited to, bi- weekly Project management meetings, Project workshops, special Project meetings, construction document rolling reviews, public meetings and partnering sessions. CM@Risk attendance at design or other meetings in which CM@Risk is provided the opportunity but does not actively participate and/or is not properly prepared is not acceptable. Repeated instances of non-participation and/or lack of preparedness will be grounds for termination of CM@Risk Agreement for default.

17.2.4      CM@Risk must provide Pre-Construction Services, described herein, in a timely manner and consistent with the intent of the most current Drawings and Specifications. CM@Risk must promptly notify City in writing whenever CM@Risk determines any Drawings or Specifications are inappropriate for the Project and/or cause changes in the scope of Work that deviates more than the allowed contingencies within the Baseline Cost Model or requires an adjustment in the Baseline Cost Model, Detailed Cost Estimate, Detailed Project Schedule, GMP Proposals and/or in the Agreement Time for the Work, to the extent such as established.

17.2.5      CM@Risk when requested by City, must attend, make presentations and participate as may be appropriate in public agency and or community meetings, relevant to the Project. CM@Risk must provide drawings, schedule diagrams, budget charges and other materials describing the Project when their use is required or appropriate in any such public agency meetings.

- 17.2.6 Ownership of Work Product. All Work Product prepared or otherwise created in connection with the performance of this Agreement, including the Work, are to be and remain the property of City. For purposes of this provision, "Work Product" will include all designs, drawings, plans, specifications, ideas, renderings and other information or material, in whatever form created (e.g., electronic or printed) and in all media now known or hereinafter created. All Work Product will be considered Work Made for Hire as defined in the United States Copyright Act 17 U.S.C. §101 (Copyright Act). If for any reason any such Work is found not to be a work for hire, Contractor hereby transfers and assigns ownership of the copyright in such Work to City. The rights in this Section are exclusive to City in perpetuity.
- 17.2.7 CM@Risk represents to City in completing Pre-Construction Services and providing the reports and analysis required thereunder, that Work can be properly and timely constructed within the GMP Proposal, if accepted. CM@Risk does not assume any design responsibilities unless specifically called for in the scope of work, but CM@Risk will be responsible for their errors, omissions or inconsistencies included in the Work.
- 17.3 **DETAILED PROJECT SCHEDULE**
- 17.3.1 The fundamental purpose of the Detailed Project Schedule is to identify, coordinate and record the tasks and activities to be performed by all of the Project Team members and then for the Project Team to utilize that Deliverable as a basis for managing and monitoring all member's compliance with the schedule requirements of the Project. Each Project Team member is responsible for its compliance with the Detailed Project Schedule requirements. CM@Risk must, however, develop and maintain the Detailed Project Schedule on behalf of and to be used by the Project Team based on input from the other Project Team members. The Baseline Project Schedule must be developed as part of the Baseline Cost Model. The Detailed Project Schedule must use the Critical Path method ("CPM") technique, unless required otherwise, in writing by City. CM@Risk must use scheduling software acceptable to City to develop the Detailed Project Schedule. The Detailed Project Schedule must be presented in graphical and tabular reports as agreed upon by the Project Team. If Project phasing as described below is required, the Detailed Project Schedule must indicate milestone dates for the phases once determined. As part of construction phase, City may require CM@Risk to prepare a "resource loaded" schedule for all work, including work performed by Subcontractors, detailing each of the project tasks and the required/anticipated number of personnel per day for each task. CM@Risk must also indicate on the schedule its ability to meet said required/anticipated personnel requirements.
- 17.3.2 CM@Risk must include and integrate in the Detailed Project Schedule the services and activities required of City, Design Professional and CM@Risk including all construction phase activities based on the input received from City and the Design Professional. The Detailed Project Schedule must define activities as determined by City to the extent required to show: (a) the coordination between preliminary design and various pre-construction documents, (b) any separate long-lead procurements, (c) any permitting issues, (d) any land, right-of-way, or easement acquisition, (e) bid packaging strategy and awards to Subcontractors and Suppliers, (f) major stages of construction, (g) start-up and commissioning, and (h) occupancy of the completed Work by City. The Detailed Project Schedule must include by example and not limitation, proposed activity sequences and durations for design, procurement, construction and testing activities, milestone dates for actions and decisions by the Project Team, preparation and processing of shop drawings

and samples, delivery of materials or equipment requiring long-lead time procurement (if any), milestone dates for various construction phases, Total Float for all activities to the extent authorized by City, relationships between the activities, City's occupancy requirements showing portions of the Project having occupancy priority, and proposed dates for Final Acceptance.

- 17.3.3 A Baseline Project Schedule must be initiated with the project Baseline Cost Model and agreed to by the project team at the same time. CM@Risk must update and maintain a detailed Project Schedule throughout pre-construction such that it will not require major changes at the start of the construction phase to incorporate CM@Risk's plan for the performance of the construction phase Work. CM@Risk must provide updates and/or revisions to the Detailed Project Schedule for use by the Project Team, whenever required, but no less often than at the Project Team meetings. CM@Risk must include with such submittals a narrative describing its analysis of the progress achieved to-date vs. the Baseline Project Schedule, including any concerns regarding delays or potential delays, and any recommendations regarding mitigating actions.
- 17.3.4 If phased construction is deemed appropriate at the time of developing the Baseline Cost Model or during the development of the Detailed Project Schedule, and City approves, CM@Risk must review the design and make recommendations regarding the phased issuance of Construction Documents to facilitate phased construction of the Work, with the objective of reducing the Project Schedule and/or Cost of the Work. CM@Risk must take into consideration such factors as natural and practical lines of work severability, sequencing effectiveness, access and availability constraints, total time for completion, construction market conditions, labor and materials availability, and any other factors pertinent to saving time and cost.
- 17.3.5 Long Lead Time Items. As part of developing the Detailed Project Schedule, CM@Risk must identify all long lead time materials, fabrications, equipment, or other items which may impact the Project Schedule and may require early action on the part of the Project Team. Dates for selecting and ordering long lead time items will be included and highlighted in the Detailed Project Schedule
- 17.3.6 Equipment Plan. Contractor must develop an Equipment Plan that addresses all rental and owned equipment, regardless of whether such equipment will be provided by CM@Risk or subcontractor(s), that will be necessary to construct the Project and the cost of which will be included as a Cost of the Work in the GMP Proposal. The Equipment Plan will seek to minimize the cost of the equipment to City and maximize the efficient and coordinated use of the equipment for completion of the Project. The Equipment Plan will not only include the costs and allowable lease rates for the equipment, but will also include an equipment schedule that will be incorporated into the Detailed Project Schedule and the Schedule of Values submitted with the GMP Proposal.
- 17.4 **DESIGN DOCUMENT REVIEWS**
- 17.4.1 CM@Risk must evaluate periodically the availability of labor, materials/equipment, cost-sensitive aspects of the design; and other factors that may create an unacceptable variance to the Baseline Cost Model and/or Baseline Project Schedule.
- 17.4.2 CM@Risk must recommend, in conjunction with the Project Team, those additional surface and subsurface investigations that, in its professional opinion, are required to provide the necessary information for CM@Risk to construct the Project. These additional

- investigations, if agreed to be necessary by the Project Manager and the Design Professional, will be acquired by City and copies of the reports will be provided to CM@Risk.
- 17.4.3 CM@Risk must meet with the Project Team as required to review designs during their development. CM@Risk must familiarize itself with the evolving documents through pre- construction. CM@Risk must proactively advise the Project Team and make recommendations on factors related to construction costs, and concerns pertaining to the feasibility and practicality of any proposed means and methods, selected materials, equipment and building systems, and, labor and material availability. CM@Risk must furthermore advise the Project Team on proposed site improvements, excavation and foundation considerations, as well as, concerns that exist with respect to coordination of the Drawings and Specifications. CM@Risk must use established value analysis principles in recommending cost effective alternatives.
- 17.4.4 CM@Risk must routinely conduct constructability and bid-ability reviews of the Drawings and Specifications as necessary to satisfy the needs of the Project Team. The reviews must attempt to identify all discrepancies and inconsistencies in the Construction Documents especially those related to clarity, consistency, completeness and coordination of Work of Subcontractors and Suppliers.
- 17.4.4.1 CM@Risk must evaluate whether: (a) the Drawings and Specifications are configured to enable efficient construction; (b) design elements are standardized; (c) construction efficiency is properly considered in the Drawings and Specifications; (d) module/preassembly design is prepared to facilitate fabrication, transport and installation; (e) sequences of Work required by or inferable from the Drawings and Specifications are practicable; (f) the design has taken into consideration efficiency issues concerning access and entrance to the site, laydown and storage of materials, staging of site facilities, construction parking, and other similar pertinent issues; and (g) the design maintains continued operation of the existing City systems and maintains traffic on adjacent roadways. CM@Risk must also review the Drawings and Specifications to ensure that what is depicted therein can be constructed as designed and must promptly inform the Project Team of any issues.
- 17.4.4.2 CM@Risk must check cross-reference and complementary Drawings and sections within the Specifications and in general evaluate whether: (a) the Drawings and Specifications are sufficiently clear and detailed to minimize ambiguity and to reduce scope interpretation discrepancies; (b) named materials and equipment are commercially available and are performing well, or otherwise, in similar installations; (c) Specifications include alternatives in the event a requirement cannot be met in the field; and (d) in its professional opinion, the Project is likely to be subject to Differing Site Conditions.
- 17.4.4.3 The results of the reviews must be provided to Project Team in formal, written reports clearly identifying all reviewed documents and the discovered discrepancies and inconsistencies in the Drawings and Specifications with notations and recommendations made on the Drawings, Specifications and other documents. CM@Risk must meet with Project Team to discuss any findings and review reports.
- 17.4.4.4 CM@Risk's reviews must be from a Contractor's perspective, and though it will serve to eliminate/reduce the number of RFIs) and changes during the construction phase, responsibility for the Drawings and Specifications will remain with the Design Professional and not CM@Risk.

- 17.4.5 It is CM@Risk's responsibility to assist the Design Professional in ascertaining that, in CM@Risk's professional opinion, the Construction Documents are in accordance with applicable Laws, Regulations, or Legal Requirements, building codes, sound engineering principle's rules and regulations. If CM@Risk recognizes that portions of the Construction Documents are at variance with applicable laws, statutes, ordinances, building codes, sound engineering principle's rules and regulations, it must promptly notify the Project Team in writing, describing the apparent variance of deficiency. However, the Design Professional is ultimately responsible for the compliance of the Drawings and Specifications with those laws, statutes, ordinances, building codes, rules and regulations.
- 17.4.6 The Project Team will routinely identify and evaluate using value analysis principles and alternate systems, approaches, design changes that have the potential to reduce Project costs while still delivering a high quality and fully functional Project consistent with the Project Program. If the Project Team agrees, CM@Risk in cooperation with the Design Professional, will perform a cost/benefit analysis of the alternatives and submit such in writing to the Project Team. City, through the Project Manager, will direct which alternatives will be incorporated into the Project. The Design Professional will have full design responsibility for the review and incorporation of CM@Risk suggested alternatives into the Drawings and Specifications. CM@Risk must analyze the costs and schedule impacts of the alternatives against the Baseline Cost Model and Schedule and provide a recommendation for the Project Team's consideration and City's approval prior to the establishment of the GMP.
- 17.5 **BASELINE COSTS MODEL, DETAILED COST ESTIMATES, AND SCHEDULE OF VALUES**
- 17.5.1 At the conclusion of the Master Planning and Programming, if required, CM@Risk will review all available information regarding the design and scope of the Project using CM@Risk's experience in performing similar work, knowledge of similar projects and current and projected construction costs and, based upon that review, must develop a Baseline Cost Model for review by the Project Team and approval by City. Once approved by City, the Baseline Cost Model will be continually referenced as detailed estimates are created as the design progresses throughout Pre-Construction until the final GMP for the entire Project is established. A final GMP for the entire Project must be established and approved by City prior to the start of construction. It is the responsibility of CM@Risk to ensure City has sufficient information to evaluate and approve a final GMP prior to the time necessary to start construction so construction can be completed within the Agreement Time. The Project Detailed Cost Estimate will be the best representation from CM@Risk of what the complete functional Project's construction costs will be as indicated by the most current available documents and will be constantly checked against the Baseline Cost Model. CM@Risk must communicate to the Project Team and assumptions made in preparing the Baseline Cost Model. The Baseline Cost Model must support CM@Risk's Detailed Cost Estimates and may be broken down initially as dictated by the available information, as required by City.
- 17.5.2 After receipt of the Design Professional's most current documents from certain specified pre- construction milestones, CM@Risk must provide a draft Detailed Cost Estimate including a detailed written report detailing any variances to the Baseline Cost Model and Baseline Project Schedule. The Design Professional and CM@Risk will reconcile any disagreements on the estimate to arrive at an agreed upon Detailed Cost Estimate for the construction costs based on the scope of the Project through that specified pre-construction milestone. Pre-Construction milestones applicable to this paragraph are:

Master Planning and Programming, Schematic Design, 50% Design Development, 100% Design Development, and 50% Construction Drawings, If no consensus is reached, City will make the final determination. If the Project Team requires additional updates of the Detailed Cost Estimate beyond that specified in this paragraph, CM@Risk must provide the requested information in a timely manner.

- 17.5.3 If at any point the Detailed Cost Estimate submitted to City exceeds the previously accepted Baseline Cost Model or previously approved Detailed Cost Estimate agreed to as set forth in Section 17.5.2 above, CM@Risk must make appropriate recommendations to project Team on means/methods, materials, and or other design elements that it believes will reduce the estimated construction costs, such that it is equal to or less than the established Project Team's Baseline Cost Model.
- 17.5.4 Unless other levels of completion are agreed to in writing in the Construction Documents, at 50% Construction Drawings and included with the associated report, CM@Risk must also submit to the Project Team for review and approval a Schedule of Values that complies with the following requirements. The Schedule of Values must be based on City standard bid schedule and highlight significant variances from any previously submitted Schedule of Values. The Schedule of Values must be directly related to the breakdowns reflected in the Detailed Project Schedule and CM@Risk's Detailed Cost Estimate. In addition, the Schedule of Values must: (a) detail unit prices and quantity take-offs, (b) detail all other contingencies and unit price Work shown and specified in the detailed design documents.
- 17.5.5 CM@Risk is to track, estimate/price and address the Project Team's overall project cost issues that arise outside of the Baseline Cost Model and the latest approved Detailed Cost Estimate such as: City generated changes, Project Team proposed changes, alternate system analysis, constructability items and value engineering analysis. The system used to implement this process will be referred to as the Design Evolution Log. This is to be addressed between the Baseline Cost Model and the Master Planning and Programming Detailed Cost Estimate, and then (unless other levels of completion are agreed to in writing in the Construction Documents) between the Detailed Cost Estimates for each of the pre-construction milestones thereafter, Schematic Design, 50% Design Development, 100% Design Development, and 50% Construction Documents, and the bid packages for all Phases.
- 17.5.6 Upon request by City, CM@Risk must submit to City a cash flow projection for the Project based on the current updated/revised Detailed Project Schedule and the anticipated level of payments for CM@Risk during the design and construction phases. In addition, if requested by City and based on information provided by City, CM@Risk must prepare a cash flow projection for the entire Project based on historical records for similar types of projects to assist City in the financing process.
- 17.5.7 Construction Water. CM@Risk must estimate the quantity of water to be used and include the cost thereof in each Detailed Cost Estimate and GMP Proposal provided by City.

17.6 **SUBCONTRACTOR AND MAJOR SUPPLIER SELECTIONS**

- 17.6.1 There are two ways to select Subcontractors and major Suppliers prior to submission of a GMP Proposal: (1) qualifications-based selection; or (2) a combination of qualifications and price. Except as noted below, the selection of Subcontractors/Suppliers is the sole responsibility of CM@Risk. In any case, CM@Risk is solely responsible for the performance of the selected Subcontractors/Suppliers, and for compliance with the requirements of

- Title 34 of the Arizona Revised Statutes in the selection of a Subcontractors/Suppliers, to the extent applicable. CM@Risk must comply with its Subcontractor Selection Plan submitted with its Statement of Qualifications.
- 17.6.2 City may approve the selection of a Subcontractor(s) or Suppliers(s) based only on their qualifications when CM@Risk can demonstrate it is in the best interest of the Project. All Work that is performed, after such a qualifications-based selection, for a price that is negotiated by CM@Risk will be billed in accordance with the GMP for actual costs and may be subject to audit by City.
- 17.6.2.1 Qualifications based selection of a Subcontractor(s)/Supplier(s) should only occur prior to the submittal of the GMP Proposal.
- 17.6.2.2 If a Subcontractor/Supplier selection plan was submitted and agreed to by City, CM@Risk must apply the plan in the evaluation of the qualifications of a Subcontractor(s) or Supplier(s) and provide City with its review and recommendations.
- 17.6.2.3 CM@Risk must receive written City approval for each selected Subcontractor(s) and Supplier(s).
- 17.6.2.4 CM@Risk must negotiate costs for services/supplies from each Subcontractor/Supplier selected under this method.
- 17.6.3 All Work must be competitively bid unless a Subcontractor or Supplier was selected pursuant to Section 17.6.2 above.
- 17.6.3.1 CM@Risk must develop Subcontractor and Supplier interest, submit the names of a minimum of three qualified Subcontractors or Suppliers for each trade in the Project for approval by City and solicit bids for the various Work categories. If there are not three qualified Subcontractors/Suppliers available for a specific trade or there are extenuating circumstances warranting such, CM@Risk may request approval by City to submit less than three names. Without prior written notice to City, no change in the recommended Subcontractors/Supplies will be allowed.
- 17.6.3.2 If City objects to any nominated Subcontractor/Supplier or to any self-performed Work for good reason, CM@Risk must nominate a substitute Subcontractor/Supplier that is acceptable to City.
- 17.6.3.3 CM@Risk must distribute Drawings and Specifications, and when appropriate, conduct a Pre- Bid Conference with prospective Subcontractors and Suppliers.
- 17.6.3.4 If CM@Risk desires to self-perform certain portions of the Work, it must request to be one of the approved Subcontractor bidders for those specific bid packages. CM@Risk's bid will be evaluated in accordance with the process identified below. If events warrant and City concurs that it is necessary in order to ensure compliance with the Project Schedule and/or the most recent Detailed Cost Estimate, CM@Risk may be authorized to self-perform Work without bidding or rebidding the Work. When CM@Risk self-performs work without bidding, only the actual costs associated with performing the Work in accordance with the approved GMP will be billed and may be subject to audit by City.
- 17.6.3.5 CM@Risk must receive, open, record and evaluate the bids; provided, however, that if CM@Risk or one of its affiliates is bidding to self-perform the Work that is the subject of the bid, then the bids must be received, opened, recorded and evaluated by Project Manager



instead of CM@Risk. Bids for each category of Work must be opened and recorded at a pre-determined time. The apparent low bidders must be interviewed to determine the responsiveness of their proposals. In evaluating the responsiveness of bid proposals CM@Risk, in addition to bid price, may consider the following factors: past performance on similar projects, qualifications and experience of personnel assigned, quality management plan, approach or understanding of the Work to be performed, and performance schedule to complete the Work. The final evaluation of Subcontractor/Supplier bids must be done with Project Manager in attendance to observe and witness the process. CM@Risk must resolve any Subcontractor/Supplier bid withdrawal, protest or disqualification in connection with the award at no increase in the Cost of Work.

17.6.4 CM@Risk will be required to prepare two different reports on the subcontracting process.

17.6.4.1 Within fifteen days after each major Subcontractor/Supplier bid opening process; CM@Risk must prepare a report for City's review and approval identifying the recommended Subcontractors/Supplier for each category of Work. The report must detail: (a) the name of the recommended Subcontractor/Supplier and the amount of the Subcontractor/Supplier bid for each sub-agreement; (b) the sum of all recommended Subcontractor/Supplier bids received; (c) and trade work and its cost that CM@Risk intends to self-perform, if any.

17.6.4.2 Upon completion of the Subcontractor/Supplier bidding process, CM@Risk must submit a summary report to City of the entire Subcontractor/Supplier selection process. The report must indicate, by bid process, all Subcontractors/Suppliers contacted to determine interest, the Subcontractors/Suppliers solicited, the bids received and costs negotiated, and the recommended Subcontractors/Suppliers for each category of Work.

17.6.5 The approved Subcontractors/Suppliers will provide a Schedule of Values with their bid proposals, which will be used to create the overall Project Schedule of Values.

17.6.6 If after receipt of sub-bids or after award to Subcontractors and Suppliers, City objects to any nominated Subcontractor/Supplier or to any self-performed Work without any reasonable basis, CM@Risk must nominate a substitute Subcontractor or Supplier, preferably if such option is still available, from those who submitted Subcontractor bids for the Work affected. Once such substitute Subcontractors and Suppliers are consented to by City, CM@Risk's proposed GMP for the Work or portion thereof must be correspondingly adjusted to reflect any higher or lower costs from any such substitution.

## 17.7 **GMP PROPOSAL**

17.7.1 When a GMP Proposal is submitted for a phase of the Work, the GMP will have a Detailed Cost Estimate of the Costs of the Work (as set forth in Section 15.2) in each phase of the Work that is being proposed plus the current estimate for all other Work. City will not approve the GMP for the phase of work without a total estimate for the complete Project. City may request a GMP Proposal for all or any portion of the Project and at any time during pre-construction. Any GMP Proposals submitted by CM@Risk must be based on and consistent with Baseline Cost Model and the current update/revised Detailed Cost Estimate at the time of the request and include any clarifications or assumptions upon which the GMP Proposal(s) are based.

17.7.2 A GMP Proposal for the entire Project will be the sum of the Cost of the Work, CM@Risk Fee, and General Conditions Cost. CM@Risk guarantees to complete the Project at or less than

the final GMP Proposal amount plus approved Change Orders. CM@Risk will be responsible for any costs for expenses that would cause the Cost of the Work actually incurred, including the Construction Fee and General Conditions Costs, to exceed the GMP.

17.7.3 CM@Risk must prepare its GMP Proposal in accordance with City's request for GMP Proposal requirements based on the most current completed Drawings and Specifications at that time, which unless otherwise directed by City in writing, will be at 100% Construction Drawings. CM@Risk must mark the face of each document of each set upon which its GMP Proposal is based. These documents must be identified as the GMP Plans and Specifications. CM@Risk must send one set of those documents to the Project Manager, keep one set and return the third set to the Design Professional.

17.7.4 An updated/revised Detailed Project Schedule, Equipment Plan, and Schedule of Values must be included in any GMP Proposal(s), all of which must reflect the GMP Plans and Specifications the Detailed Project Schedule must be shown in relationship to the Project Schedule and identify any variance to the Baseline Project Schedule. Any such Detailed Project Schedule updates/revisions must continue to comply with the requirements of Section 17.3.1 through 17.3.5.

17.7.5 **GMP Proposals(s) Review and Approval**

17.7.5.1 CM@Risk must meet with the Project Team to review the GMP Proposal(s) and the written statement of its basis. In the event the Project Team discovers inconsistencies or inaccuracies in the information presented, CM@Risk must make adjustments as necessary to the GMP Proposal.

17.7.5.2 If during the review and negotiation of GMP Proposals design changes are required, City may authorize and cause the Design Professional to revise the GMP Plans and Specifications to the extent necessary to reflect the agreed-upon assumptions and clarifications contained in the final approved GMP Proposal. Such revised GMP Plans and Specification will be furnished to CM@Risk. CM@Risk must promptly notify the Project Team in writing if any such revised GMP Plans and Specifications are inconsistent with the agreed upon assumptions and clarifications.

17.7.6 All portions of or items comprising the GMP Proposal are subject to audit by City, as deemed appropriate by City, including, without limitation, any based upon unit prices or Work to be self-performed by CM@Risk, or its affiliates.

17.8 **PAYMENT PROCEDURE FOR PRE-CONSTRUCTION SERVICES**

17.8.1 Requests for monthly payments by CM@Risk for Pre-Construction Services must be submitted monthly and must be accompanied by a progress report, detailed invoices and receipts, if applicable. Any requests for payment must include, as a minimum, a narrative description of the tasks accomplished during the billing period, a listing of any Deliverables submitted, and copies of any Subconsultants' requests for payment, plus similar narrative and listings of Deliverables associated with their Work. Payment for services negotiated as a lump sum will be made in accordance with the percentage of work completed during the preceding month.

17.8.2 In no event will City pay more than seventy-five (75%) of the Agreement Price until acceptance of ALL Pre-Construction Services and award of the final approved Construction Services Agreement for the entire Project by City Council. If CM@Risk does not prepare a

GMP Proposal that is acceptable to City, or the GMP Proposal exceeds the City's Construction Budget, then CM@Risk understands and acknowledges that it will forfeit any right to receive the 25% of the Agreement Price being retained by City.

17.8.3 CM@Risk agrees that no charges or claims for costs or damages of any type will be made by it for any delays or hindrances beyond the reasonable control of City during the progress of any portion of Pre-Construction Services specified in this Agreement. Such delays or hindrances, if any, will be solely compensated for by an extension of time for such reasonable period and may be mutually agreed between the parties. It is understood and agreed, however, that permitting CM@Risk to proceed to complete any such Services, in whole or in part after the date to which the time of completion may have been extended, will in no way act as a waiver on the part of City of any of their respective legal rights herein.

17.8.4 No compensation to CM@Risk will be allowed contrary to Article I, Chapter I, Title 34 of the Arizona Revised Statutes.

17.8.5 If any service(s) executed by CM@Risk is abandoned or suspended in whole or in part, for a period of more than 180 days through no fault of CM@Risk, CM@Risk is to be paid for the services performed prior to the abandonment or suspension.

17.9 **SURVIVAL OF THE DESIGN SERVICES AGREEMENT, DUTIES, OBLIGATIONS AND WARRANTIES**

If the GMP Proposal is accepted by City and a Construction Agreement is entered into between City and CM@Risk, the duties, obligations and warranties of CM@Risk under the Pre- Construction Services Agreement survive and are incorporated into the resulting Construction Agreement.

# General Conditions Appendices

## **SECTION 15 – APPENDICES**

The following Appendices attached hereto are referenced in the General Conditions and are incorporated herein.

- Appendix 1 – Policy Statement for Calculating Delays and Damages
- Appendix 2 – Cost Reduction Incentive Proposals for Design Bid Build Agreements
- Appendix 3 – Contractor's Affidavit Regarding Settlement of Claims
- Appendix 4 – Forms of Performance Bond
- Appendix 5 – Forms of Payment Bond
- Appendix 6 – Dispute Resolution
- Appendix 7 – Certificate of Completion
- Appendix 8 – Construction Sign Detail
- Appendix 9 – Cost of the Work (Applicable solely to Construction Manager at Risk and Job Order Contracting)
- Appendix 10 – Landscape Establishment Period

## **CALCULATING DELAYS AND DAMAGES**

The purpose of this policy statement is to establish guidelines and procedures for negotiation between the Contractor and City of Chandler relating to compensation for delays pursuant to Arizona Revised Statutes (A.R.S.) 34-221(F). This policy statement contains notice requirements in addition to those set forth in the Agreement Documents, and will be the Agreement Provision contemplated by that statute.

NOTE: As used herein, the term "Engineer" will refer to the City of Chandler City Engineer or his/her designated representative. Nothing in this Policy Statement will be construed to void any provision in the Agreement which requires timely notice of delays or provides for arbitration or any other procedure for settlement or provides for liquidated damages.

### **I. TYPES OF DELAYS:**

For the purposes of this document, there are essentially four types of delays encountered by City of Chandler Construction Contractors; excusable/compensable, excusable/non-compensable, non-excusable, and concurrent. Only delays that extend Agreement Completion Time set forth in the Agreement Document will be considered for issues relating to Agreement extensions or additional compensation. All other delays are considered to be activity delays and do not entitle the Contractor to either time extensions or additional compensation. Agreement Completion Time will be defined as the date set forth in Maricopa Association of Governments (MAG) Uniform Standard Specification Section 101 and as may be modified by the Agreement Documents.

#### **A. Excusable/Compensable:**

These are delays caused solely by the City's actions or inactions, are unreasonable under the circumstances, and which were not within the contemplation of the parties to the Agreement at or prior to the time of execution of the Agreement. Since the Contractor presumably has no control over the events causing the delay, he may be entitled to both Agreement time extensions and additional compensation for delay damages. Further, he/she may be entitled to additional compensation from the impact of that delay on other work. Examples of excusable/compensable (E/C) delays include: failure to properly locate an underground City-owned utility within 2 feet of the actual location; failure to relocate City-owned utilities far enough in advance of construction in an area where the Contractor is scheduled to work that it delays start or completion of the Contractor's regularly scheduled work; failure to provide City-furnished equipment or materials in a timely manner if required by the Agreement; failure to acquire necessary Right-of-Way or Public Utility Easements prior to the Contractor beginning Work in the area; failure to timely return Shop Drawings or other Agreement Submittals in accordance with the Agreement; unreasonable delay by the City in making decisions which affect critical activities; surveying errors when the City is contractually responsible for providing Project Surveying. This list is not meant to be all inclusive, but is intended merely as examples of the type of City action or inaction which can result in a Contractor's claim for additional time and compensation.

## General Conditions

### Appendix 1

#### B. Excusable/Non-compensable:

These are delays over which neither the City nor the Contractor had control. Since both parties to the Agreement have been potentially damaged by the delay, but neither have caused it, only Time Extensions are warranted. Examples of excusable, non-compensable (E/N) delays include: unusually severe weather; fire; acts of God; failure of non-City owned utilities (SRP, CenturyLink, Cable TV, Southern Pacific Railroad, and Southwest Gas, etc.) to properly or timely locate accurately; failure of non-City owned utilities to relocate in advance of construction; the voluntary or involuntary filing for Bankruptcy protection by a Supplier or Subcontractor which causes the Supplier/Subcontractor to fail to meet a contractual deadline provided the Contractor can provide documentation that he/she executed the required Purchase Orders/Subcontract Agreements and received delivery schedules which, if met, would have eliminated the delay; delays as a result of an incomplete shutdown of a City or non-City owned utility main (the City does not guarantee a complete shutdown). This list also is not necessarily all inclusive but merely indicative of type and class of E/N delays.

#### C. Non-excusable/Non-compensable:

These are delays caused by the actions or inactions of Contractor or an officer, employee, agent, Subcontractor, Supplier or any other party for whom the Contractor is responsible. Since the Contractor has assumed responsibility for the risks associated with the events that caused the delay, he/she are not entitled to either time extensions or monetary delay damages. All non-excusable delays are also non-compensable. Examples of non-excusable, non-compensable (N/N) delays include: failure to perform by the Contractor, its Subcontractors and/or Suppliers (except as noted in section I.B above); failure to provide adequate labor, materials, and/or equipment on the Project; failure to perform contractually-required coordination with utilities, agencies and other Contractors; failure to notify the Engineer, in writing, of delay impacts within two working days, as required by MAG 104.2.3, or the next work day, as required by MAG 109.8.2; failure to timely submit Shop Drawings; failure to pothole or otherwise visually locate utilities sufficiently ahead of the Work to allow the Engineer to direct corrective action when necessary; delays due to retesting of previously failed work, re-inspection, and/or restaking resulting from faulty workmanship, poor quality control, or lack of compliance with Agreement Specifications. Again, this list is not necessarily all inclusive.

#### D. Concurrent:

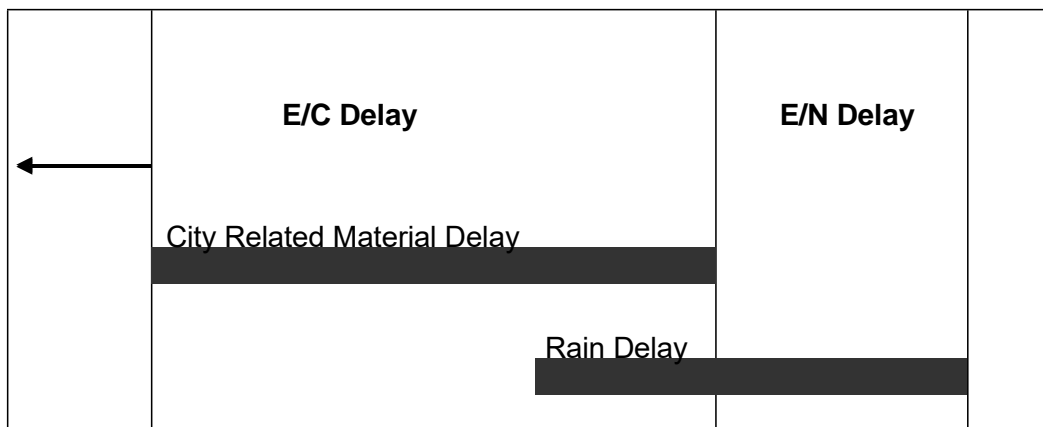
When two or more delays occur simultaneously or overlap, each delay is analyzed separately to determine its impact on the overall project completion date based on when that delay started. Once again, only those delays which actually extend the Agreement completion time are considered as delays. The concurrent delay is considered an additional delay only to the extent it prolongs the delay to the Agreement Completion Time beyond the date that the one it is concurrent with had already delayed that date. For example, if two delays are concurrent, and one is five days long and the second is seven days long, the second concurrent delay will only extend the Agreement Completion Time by two days. The same method of analysis is

## General Conditions Appendix 1

used when there are multiple concurrent delays. Only those extending the Project Completion Date are considered to be delays for the purposes of this policy. The portion of each concurrent delay that delays the completion of the work is classified in the same manner as described previously for individual delays and being either E/C, E/N or N/N.

An example of a concurrent delay is where the City delays furnishing material, but the Contractor could not have installed it anyway due to unusually severe weather. The effect of the first delaying activity will extend for the full duration and will be considered controlling on the Contractor's schedule. A subsequent, concurrent delay will thereafter only be considered to effect the project completion (if at all) once the first delaying activity has ceased to impact the project completion. In this case, if the unusually severe weather continued and delayed the work after the material was delivered, the first portion of the delay would be classified E/C (delay for material) and the second as E/N (delay due to unusually severe weather). Using the procedure set forth above, the entire concurrent portion would be considered E/C as shown in the chart which follows.

Example of a Concurrent Delay:



### II. ANALYZING THE DELAY:

The Contractor must provide all documents required or requested by the Engineer to analyze the delay(s). It is important to understand that, prior to the delay analysis, delays and their impacts are alleged issues. The information the Contractor provides will be compared with the Inspector's Daily Log, Schedules and other available Project information and together they will support or refute that delays occurred and, if so, how they impact other work and the overall project completion. The Contractor's delay in providing these documents will be considered prima facie evidence that either the delay did not occur or it did not impact the Project Completion Date and any claim for time extension or damages will be denied.

The Engineer will accept delay analyses in CPM format, as these may demonstrate to his/her satisfaction whether or not Project Completion has been impacted by a specific event. If the Contractor chooses not to use CPM scheduling procedures, then the burden will be on the Contractor to prove to the Engineer's satisfaction that the Project Completion has been impacted. The procedures

## General Conditions Appendix 1

below assume that the Contractor is using CPM scheduling methods. As a minimum the Contractor must provide the following materials to the Engineer:

- A. As-Planned Schedule. The initial construction schedule, required by the Agreement Documents, will be considered the baseline schedule. It is to the Contractor's advantage that the As-Planned (baseline) Schedule be as detailed as possible in order for delays, as they occur, to be incorporated into the schedule in representative locations. It is also to the Contractor's advantage to use a computer software program to generate the schedule since updated schedules are required monthly by the Agreement Documents and since updated schedules are required to support delays and requests for additional compensation for delays. The As-Planned (baseline) Schedule must be presented in network format which clearly shows the interrelationships of the activities. The Contractor must also provide a printout of the activities showing early start, early finish, late start, late finish, duration and float. The activity list printout must also indicate predecessor and successor activities.
- B. As-Built Schedules. The as planned (baseline) schedule must be updated with complete progress-to-date information (actualized) up to the date of the start of the alleged delay. Each updated schedule will serve as the as-built schedule for analyzing the alleged delay and provide a new baseline as-planned schedule for the next delay. This process must be repeated for each alleged delay as it occurs. In updating the baseline schedule, the alleged delay must be treated as an activity and inserted into the schedule as a predecessor to the impacted activity (ies). When an activity that has already started is impacted, it is preferable to divide this activity into two parts and show the impact affecting the second part. For schedules which incorporate a time line (or data date), the delay activity must be inserted at the time it actually occurred. Some software scheduling programs have a PAUSE-RESUME feature that can be used to facilitate the requirements. The updated schedule must also be accompanied by a listing of activities as with the baseline schedule. This activities list must contain the alleged delay as an activity showing the duration and the activities which are predecessors and successors to it. When computer generated schedules are used, the Contractor must provide, in electronic media format, the complete data files for the updated schedule that included the delay activity, preferably either in Suretrak or in Microsoft Project. Each electronic media must contain a label identifying the Project name, Contractor's name, program name and version number, data date and project finish date.
- C. Other Documents: In order to determine the amount of the alleged delay and if it is compensable, the Contractor must provide all backup documentation relevant to the issue and as required by the Engineer. This documentation must include copies of such items as: purchase orders; delivery schedules; correspondence; memoranda of telephone calls; force account daily worksheets (initialed by the Inspector); payroll data; estimating (bid) worksheets; and any other materials which may be requested by the Engineer.
- D. Procedure: Only after receipt of sufficient documentation will the Engineer analyze each alleged delay and determine if it is supported or refuted. If supported, the Engineer will determine if it is excusable or non-excusable, compensable or non-



## General Conditions Appendix 1

compensable. If the Engineer determines that the delay did not affect the Project Completion, the as-planned schedule, which has been updated to the date of the alleged delay, must be revised to indicate this. If the Engineer determines the delay did occur but was N/N, then no time extension will be granted. It is imperative that an actualized schedule be submitted as soon as the occurrence of the alleged delay is known. In no event will the Contractor submit an actualized updated schedule later than 60 days after the occurrence of the alleged delay becomes known.

If the Engineer determines the delay did occur and was excusable but, due to a reason listed in section I.B. is non-compensable, he/she will determine the length of the E/N delay and prepare a Change Order to add that time to the Agreement. The Engineer's decision will be final.

If the Engineer determines the delay was excusable and compensable, he/she will determine the length of the E/C delay and proceed to review the Contractor's damage calculations in accordance with Section III. The Engineer will check the Contractor's calculations, review the backup documentation provided, and prepare a Change Order to cover both the additional compensation and the time extension. The Engineer's decision on both the time extension and additional compensation for the delay will be final.

If the issue involves a concurrent delay, the Engineer will analyze available data to determine the portions which are E/C, E/N, and/or N/N as described above. The Engineer will proceed to determine the length of E/C delay and verify the Contractor's delay damage calculations, if any are provided. Upon completion of this review, the Engineer will prepare a Change Order for the Contractor's review and signature. The Engineer's decision regarding excusable delay and additional compensation for the delay is final.

The amount of time the Engineer will require to analyze the alleged delay(s) will depend upon the Engineer's workload, the complexity of the delay analysis, availability of supporting data, extent of cooperation by the Contractor, and other factors beyond the Engineer's control. It is entirely possible other delay(s) may occur while the Engineer is analyzing particular claim for delay(s). The Engineer's failure to respond to the Contractor in a set period of time will not be used as the basis for a further delay claim or as justification for extending and existing delay claim. The time required for delay analysis by the Engineer will not be counted against the time allotted for processing Final Payment as required by (MAG Section 109.7(B)) or the release of retention and Final Payment as prescribed by A.R.S. Arizona Revised Statutes §34-221.

### III. CALCULATING MONETARY DELAY DAMAGES:

Additional compensation for delay, when authorized by the Engineer, will be calculated in accordance with MAG Section 109.5 ACTUAL COST WORK with the following exceptions:

- A. No additional compensation or other monetary damages will be awarded or paid for any loss of anticipated profits by the Contractor, Subcontractors or Suppliers.

## General Conditions Appendix 1

- B. No additional compensation or other monetary damages will be awarded for home office overhead or non-project general conditions of the Contractor, Subcontractors or Suppliers.
- C. Equipment:
  - 1. Contractor-owned equipment rate calculations must be computed in accordance with Section 109.04(D)(3), Arizona Department of Transportation "Standard Specifications for Road and Bridge Construction," 2008 or latest edition and as modified herein. Year and regional adjustment factors must be based on the most recent publications of the Rental Rate Blue Book for Construction Equipment, published by the Equipment Guide-Book Company, San Jose, CA, same as provided by ADOT and in print as of the date of alleged delay. In no event will the compensation for Contractor-owned equipment exceed the purchase price, including tax, paid by the Contractor for the equipment. Compensation will not be allowed for small tools or equipment that show a daily equipment rental rate of less than \$5.00 per day or for unlisted equipment that has a value of less than for hundred dollars (\$400.00).
  - 2. For leased and rented equipment or equipment not otherwise listed in the Blue Book, rental contracts, or other supporting data will be used to establish the hourly rate. No hourly operating expense will be allowed for delay on standby equipment. In no case will equipment be considered for rental which exceeds the hourly rate for the first eight hours and the daily rate divided by eight for all additional hours as compared with similar equipment listed in the Blue Book. The hourly standby rate must be computed as the lesser of:
    - a. Dividing the monthly invoice or rental value by 176 hours per month when the equipment is utilized by the Contractor for more than three weeks;
    - b. Dividing the monthly invoice or rental value by 40 hours per week when the equipment is utilized by the Contractor for more than three days.

In no event will compensation be paid for delay at more than 8 hours per day or 40 hours per week.
  - 3. Except for vehicles used by supervisory personnel, all equipment will be paid at the "standby" rate during the delay period.
  - 4. Equipment brought solely to mitigate the delay (such as pumps, light plants, etc.) may be paid in accordance with ADOT section 109.04(D) (3).
  - 5. The Blue Book regional adjustment will apply in determining rental rates.
- D. Material:

Allowable material charges may include, in addition to material incorporated in the

## General Conditions

### Appendix 1

work material used to mitigate the delay such as barricades, plates, shoring, cold mix, etc. Except in emergencies the Contractor will not employ such material without the prior written approval of the Engineer.

#### E. Labor:

1. Except for Supervisory Personnel (Superintendent, Project Engineer, and Foremen), labor wages will not be paid after the first one-half day of claimed delay or impact. It is expected the Contractor will reassign or layoff unneeded employees.
2. For Foreman wages to be included, that Foreman must have been actively employed on the project prior to the commencement of the delay and be directly responsible for the activity being delayed.
3. Labor burden must be actual amounts incurred but must not exceed the ADOT approved rate.

#### F. All costs (equipment, material, and labor) must be substantiated by the City of Chandler's Daily Work Reports.

### IV. DOCUMENT REQUIRED FOR CLAIM ANALYSIS:

For purposes of reviewing the Contractor's request for additional compensation, it will be required that the Contractor submit the following listed information. Information requested must be prepared on forms which are substantially similar to the City of Chandler's Daily Work Report form, a copy of which is attached as an exhibit.

#### A. Labor:

For each employee, laborer, and foreman, for which compensation is requested: Name, classification, dates of work performed, daily hours worked, total hours worked, labor rates, labor burden rates, overtime or premium time charges. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Certified payroll reports for the period of work claimed.
2. Accounting of Fringe Benefits – certified by a CPA.
3. Contractor's and Subcontractor's daily field reports and daily diaries.

#### B. Materials:

For all materials for which compensation is requested, if any, total quantities of materials, prices, extensions and transportation costs must be provided on a daily basis. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Invoices for all materials incorporated.
2. Weigh tickets.
3. Purchase orders.

## General Conditions

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4. Delivery schedules.
5. Quotes or proposals from manufacturers or supplier.
6. Freight bills, Bills of Lading, or other documentation to show transportation costs.
7. Restocking charges-invoices from vendor.

#### C. Equipment:

For all equipment, the Contractor must provide the Engineer with the designation, dates and hours of usage, dates and hours of standby, if any, daily hours, total hours, rental rates and extension for each unit of equipment and machinery. Rental rates will be as established in Section III. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Owned:
  - a. Purchase contracts(s).
  - b. Depreciation schedule(s).
  - c. Invoices for fuel, lube, repairs and other operating costs.
2. Leased:
  - a. Lease agreement with hourly rate, overtime rate, double shift rate, etc.
  - b. Invoices or other documentation showing hours worked on a daily basis.

#### D. Subcontractors/Owner-Operators:

In the event the Contractor submits a claim which includes requests for compensation for Subcontractors of Owner-Operators, the same information requested of the Contractor must be provided by the Subcontractor/Owner-Operator. Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Bid/Estimate work sheets and/or spreadsheets.
2. Subcontract Agreements or Agreements with Owner-Operator.
3. All invoices and billing statements received from the Subcontractor/Owner-Operator which relates to the amount requested.

#### E. Miscellaneous:

Further, the Contractor must make available for inspection and copying to the Engineer the following listed documentation.

1. Evidence of payment for bonds and insurance premiums (MAG 109.5.6).
2. Taxes – unless the Contractor can show otherwise, taxes are reimbursable at 65% of the total cost (less bonds and insurance).

#### V. TIME LIMIT ON SUBMISSIONS OF CLAIM FOR DELAY OR IMPACT DAMAGES:

No claims for delay or impact damages will be considered or allowed more than 45 days after the event or occurrence which the Contractor claims gives rise to the delay or impact. In no event will a

General Conditions  
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claim for delay or impact damages be considered after submission by the Contractor of the Final Payment Request.

### **COST REDUCTION INCENTIVE PROPOSALS FOR DESIGN BID BUILD AGREEMENTS**

The Contractor may submit to the Engineer proposals for modifying the Plans, Specifications, or other requirements of the Agreement for the sole purpose of reducing the total cost of Project construction. The proposals must not impair in any manner the essential functions or characteristics of the project; including but not limited to service life, economy of operations, ease of maintenance, desired appearance, compatibility with existing or planned equipment, standardization of systems, or design and safety standards.

It must not be inferred from this Policy that the Engineer is required to consider any proposal submitted.

Submissions that propose changes in the basic design of a bridge, propose changes in pipe line size, materials, bedding conditions, pipe specifications; or that propose any change in pavement design will not be considered.

Proposals submitted pursuant to this Policy will be identified as Cost Reduction Incentive Proposals. They must be submitted in writing and, at a minimum, contain the following.

1. Complete the attached or similar cost reduction incentive proposal form.
2. A description of both the existing Agreement Requirements for performing the work and the proposed changes.
3. All Engineering Drawings and computations necessary for the thorough and expeditious evaluation.
4. An itemization of the existing Agreement Requirements that must be changed if the Proposal is adopted and a recommendation as to the manner in which the change should be made.
5. A detailed estimate of the cost of performing the Work under the existing Agreement and under the proposed changes, including the cost of developing and implementing the changes.
6. The Agreement items affected by the proposed changes and any variations in quantities resulting from the changes.
7. An objective estimate of any effects the proposal will have on collateral cost to the City, costs of related items, and cost of maintenance and operation.
8. A statement as to the effect that the Proposal will have on the time for the completion of the Project.
9. A statement as to the time by which a Change Order adopting the Proposal must be executed or when the Engineer must have given verbal approval.

## General Conditions Appendix 2

Proposals will be processed expeditiously; however, the City will not be liable for any delay in acting upon any Proposal nor for any failure to accept any Proposal pursuant to this Special Provision.

The Engineer will be the sole judge of the acceptability of a Proposal and of the estimated net savings in construction costs from the adoption of all or any part of the Proposal. The Contractor will be notified in writing by the Engineer as to whether his/her Proposal has been accepted. The decision by the Engineer is final.

When the City deems such action to be appropriate, it reserves the right to require the Contractor to share equally in the cost to the City of investigating, evaluating, and processing the proposal as a condition for the consideration of such Proposal. Such cost must be shared whether the Proposal is accepted or rejected. When such a condition is imposed, the City will estimate these costs and the Contractor must indicate his acceptance thereof in writing. Such acceptance will authorize the City to deduct the Contractor's share of the costs from any monies due or that may become due to the Contractor under the Agreement.

If the Contractor's Proposal is accepted in whole or in part, the necessary Agreement Modifications and Agreement Price Adjustments will be affected by the execution of a Change Order which will specifically state that it is executed pursuant to this Special Provision.

The Contractor must continue to perform the work in accordance with the requirements of the Agreement until a Change Order incorporating the Proposal has been executed or until he/she has been given verbal approval by the Engineer that his/her Proposal has been accepted. If the Change Order has not been executed or he/she has not been given verbal approval on or before the date specified on the attached cost reduction incentive proposal form or on or before such other date as the Contractor may have subsequently specified in writing, the Proposal may be deemed to be rejected.

The executed Change Order will incorporate the changes in the Plans, Specifications, or other requirements of the Agreement which are necessary to permit the Proposal, or such part of it which has been accepted, to be put into effect, and will include any condition – upon which the City's approval thereof is based, if such approval is conditional. The executed Change Order may also extend the time for the completion of the Agreement if such an extension has been deemed to be warranted by the Engineer as a result of his evaluation of the Proposal.

The executed Change Order will also establish the estimated net savings in the cost of performing the Work attributable to the Proposal effectuated by the Change Order. In determining the net savings, the right is reserved to the Engineer to disregard the Agreement bid prices if, in his/her judgment, such prices do not represent a fair measure of the value of the Work to be performed or to be deleted. The net savings will be established by determining the Contractor's cost of performing the Work, taking into account his/her cost of developing the Proposal and implementing the change, and reducing this amount by any ascertainable collateral costs to the City. The executed Change Order may provide that the Contractor be paid 50 percent of the estimated net savings amount.

The executed Change Order may also provide for the adjustment in Agreement prices. Agreement prices may be adjusted by subtracting the City's share of the accrued net savings.

The amount specified to be paid to the Contractor in the executed Change Order which effectuates a Cost Reduction Proposal will constitute full compensation to the Contractor for the Cost Reduction

## General Conditions Appendix 2

Proposal and the performance of the work thereof pursuant to the said Change Order.

Upon acceptance of a Cost Reduction Incentive Proposal, any restrictions imposed by the Contractor on its use or on disclosure of the information will become void, and the City thereafter will have the right to use all or any part of the Proposal without obligation or compensation of any kind to the Contractor.



**COST REDUCTION INCENTIVE PROPOSAL FORM**

**TO:** CIP City Engineer

**FROM:**

**PROJECT NAME:** Taxiway B Improvements Phase 1

**CITY PROJECT NUMBER:** AI2302.401; ADOT No.: E3S4C

**DATE:**

---

Summary of Change (Brief description of proposed change including advantages and disadvantages):

---

ESTIMATED COST SUMMARY (Attached detailed estimate):

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A.	Original Cost:	\$	
B.	Proposed Cost:	\$	
C.	Construction Savings (A-B):	\$	
D.	Gross Savings (Included OH      %, Bond      %)	\$	
E.	Contractor Implementing	\$	
F.	City Implementing Cost:	\$	
	Reduction in Agreement Price (C+D-E-F) x 50%:	\$	

Date by which a Change Order must be issued so as to obtain maximum cost reduction:

**CITY OF CHANDLER, ARIZONA  
PUBLIC WORKS & UTILITIES DEPARTMENT**

**CONTRACTOR'S AFFIDAVIT REGARDING SETTLEMENT OF CLAIMS**

\_\_\_\_\_, Arizona  
Date \_\_\_\_\_

**Project Name: Taxiway B Improvements Phase 1  
City Project No.: AI2302.401; ADOT No.: E3S4C**

To the City of Chandler, 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 total compensation of \$\_\_\_\_\_, as set out in the final pay application, as full and complete payment under the terms of the Agreement, 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 Chandler against any and all liens, claims or liens, suits, actions, damages, charges and expenses whatsoever, which said City may suffer arising out of the failure of the undersigned to pay for all labor performances 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

**PERFORMANCE BOND**

ARIZONA STATUTORY PERFORMANCE BOND  
PURSUANT TO TITLES 28, 34, AND 41, ARIZONA REVISED STATUTES  
(Penalty of this bond must be 100% of the Agreement amount)

**KNOW ALL MEN BY THESE PRESENTS THAT:** \_\_\_\_\_

(hereinafter "Principal"), and \_\_\_\_\_ (hereinafter "Surety"), a corporation organized and existing under the laws of the State of \_\_\_\_\_ with its principal office in the City of \_\_\_\_\_, holding a certificate of authority to transact surety business in Arizona issued by the Director of Insurance pursuant to Title 20, Chapter 2, Article 1, as Surety, are held and firmly bound unto \_\_\_\_\_ (hereinafter "Obligee") in the amount of \_\_\_\_\_ (Dollars) (\$\_\_\_\_\_), for the payment whereof, Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Agreement with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_ for construction of **Taxiway B Improvements Phase 1, City Project No.: AI2302.401; ADOT No.: E3S4C** which Agreement is hereby referred to and made a part hereof as fully and to the same extent as if copies at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal faithfully performs and fulfills all the undertakings, covenants, terms, and conditions of the Agreement during the original term of the Agreement and any extension of the Agreement, with or without notice of the Surety, and during the life of any guaranty required under the Agreement, and also performs and fulfills all the undertakings, covenants, terms, conditions, and agreements of all duly authorized modifications of the Agreement that may hereafter be made, notice of which modifications to the Surety being hereby waived, the above obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, and all liabilities on this bond will be determined in accordance with the provisions of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, to the same extent as if it were copied at length in this Agreement.

The prevailing party in a suit on this bond may recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the court.

Witness our hands this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
AGENT OF RECORD

\_\_\_\_\_  
PRINCIPAL SEAL

By \_\_\_\_\_

\_\_\_\_\_  
SURETY SEAL

\_\_\_\_\_  
AGENT ADDRESS

**PAYMENT BOND**

ARIZONA STATUTORY PAYMENT BOND  
PURSUANT TO TITLES 28, 34, AND 41, OF THE ARIZONA REVISED STATUTES  
(Penalty of this Bond must be 100% of the Agreement amount)

**KNOW ALL MEN BY THESE PRESENTS THAT:**\_\_\_\_\_

(hereinafter "Principal"), as Principal, and \_\_\_\_\_(hereinafter "Surety"), a corporation organized and existing under the laws of the State of \_\_\_\_\_ with its principal office in the City of \_\_\_\_\_, holding a certificate of authority to transact surety business in Arizona issued by the Director of the Department of Insurance pursuant to Title 20, Chapter 2, Article 1, as Surety, are held and firmly bound unto \_\_\_\_\_ (hereinafter "Obligee") in the amount of \_\_\_\_\_ (Dollars) (\$\_\_\_\_\_), for the payment whereof, the Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Agreement with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_ for construction of **Taxiway B Improvements Phase 1, City Project No.: AI2302.401; ADOT No.: E3S4C** which Agreement 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 Principal promptly pays all moneys due to all persons supplying labor or materials to the Principal or the Principal's subcontractors in the prosecution of the work provided for in said Agreement, this obligation is void. Otherwise it remains in full force and effect.

PROVIDED, HOWEVER that this bond is executed pursuant to the provisions of Title 34, Chapter 2, Article 2 Arizona Revised Statutes, and all liabilities on this bond will be determined in accordance with the provisions, conditions and limitations of Title 34, Chapter 2, Article 2, Arizona Revised Statutes, to the same extent as if it were copied at length in this Agreement.

The prevailing party in a suit on this bond may recover as part of the judgment reasonable attorney fees that may be fixed by a judge of the court.

Witness our hands this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

_____	_____	_____
AGENT OF RECORD	PRINCIPAL	SEAL
	By _____	
_____	_____	_____
AGENT ADDRESS	SURETY	SEAL

## **DISPUTE RESOLUTION**

### **A. INFORMAL DISPUTE RESOLUTION**

The parties to the Agreement agree that time is of the essence in relation to performance of the Agreement and completion of the Project, therefore any and all disputes in relation to the Agreement will initially be referred to the Project Manager, the Design Professional Representative and/or the Contractor Representative as applicable to the dispute, for immediate resolution. If, after good faith efforts to reach a resolution, none is reached, any party to the dispute may submit the dispute to the Dispute Resolution Representative ("DRR") process set forth below, which is intended to be an expedited process.

### **B. DISPUTE RESOLUTION REPRESENTATIVE ("DRR") PROCESS**

1. The Parties under the Agreement agree that all claims and disputes in relation to the Project which are not resolved in the ordinary course of the Project ("Claim" or "Claims") will, as a prerequisite to any mediation, or litigation of the Claim, first be submitted for resolution between the designated Dispute Resolution Representatives of the Parties as set forth herein (the "DRR Process").
2. The DRR Process will be initiated through service of a DRR Notice as set forth below:
  - a. For claims by the Contractor or the Design Professional, the DRR Process will be initiated by the party asserting the claim serving written notice on the City setting forth in detail: (i) the basis for the claim; (ii) the effect of the Claim upon the construction of, and/or Project Schedule for, the Project; (iii) the specific relief requested, the amount thereof, and how such was calculated; (iv) the parties involved in the Claim, and how they are involved; (v) the specific Agreement provisions in the Agreement Documents (including, if applicable, drawings and specifications) which apply; and (vi) efforts made to date to resolve the Claim.
  - b. For claims by the City, the DRR process will be initiated by the City providing written notice to the other parties of the basis and amount of its claim, the parties involved in the Claim, and how they are involved, the provisions in the Agreement Documents that apply, and the relief requested.
  - c. The DRR Notice will be hand-delivered and e-mailed to the other parties' designated Dispute Resolution Representatives.
3. The other parties will respond in writing to the DRR Notice ("DRR Response") within ten (10) calendar days of receipt of the DRR Notice, setting forth those items set forth in the DRR Notice that they agree with, dispute, and/or have questions concerning. The DRR Response will be hand-delivered and e-mailed to the other parties' Dispute Resolution Representatives.

4. The designated Dispute Resolution Representatives for the Parties to the claim will then meet as soon as possible and in any event within twenty (20) calendar days of submission of the DRR Notice (regardless of whether a DRR Response has been submitted by all parties involved in the dispute), at a mutually agreed upon time and place, to attempt to resolve the Claim based upon the DRR Notice and DRR Response.
5. At any time after the first meeting required above, either party may terminate the DRR Process by written notice to the other party.
6. The parties may agree, in writing, to extend or modify the time limits or other provisions of the DRR process in relation to a specific pending Claim.
7. Unless otherwise designated in a written notice to the other parties, the City and the representatives of the Contractor and of the Design Professional will act as the parties' designated Dispute Resolution Representatives.
8. If a resolution of the Claim is reached, that resolution must be set forth in writing and must be signed by the Parties' designated Dispute Resolution Representative. If the resolution involves a change in any Agreement Documents, the Agreement Price, the Project Schedule, or any other change requiring a written Change Order or Amendment, the parties must execute an appropriate written Change Order or Amendment pursuant to the terms of the Agreement Documents.

C. MEDIATION

1. Unless extended by written agreement of the parties involved in the dispute, any Claim not resolved through the DRR process set forth above within five (5) calendar days after the meeting required under B (4) above, or after the DRR is terminated pursuant to B (5) above, whichever is earlier, will be submitted to mediation as a condition precedent to litigation by either party.
2. The mediation will be commenced by written demand upon the other party for mediation. If the parties cannot agree upon a mediator within ten (10) calendar days of the written demand, either party may make a request to the Civil Presiding Judge of the Maricopa County Superior Court to appoint a mediator. The mediation will occur within forth (40) calendar days of the written demand for mediation, unless the parties agree, in writing, to a longer period of time.
3. The qualifications for the mediator will be that he/she be: (a) an experienced mediator, arbitrator or litigator of construction disputes; and (b) having engaged a significant portion of his/her time involving and/or resolving construction disputes for at least the past five (5) years.
4. Each party will provide to the other party and the mediator all of the information and documentation required under B(1) and (2) above, together with any additional information and documentation which the party believes relevant. In addition, the parties will exchange, and provide to the mediator such additional memoranda, information and/or documentation, as the

mediator may request, and in the form and at such times, as the mediator may direct.

5. The parties will share the mediator's fee and any filing fees equally. The mediation will be held in Chandler, Arizona, unless another location is mutually agreed upon. Agreements reached in mediation will be specifically enforceable in any court having jurisdiction thereof.

D. LITIGATION

Any claim arising out of or related to the Agreement, except Claims relating to aesthetic effect and except those claims waived as provided for in the Agreement Documents, must be resolved through litigation in the Maricopa County, Arizona Superior Court.



**CITY OF CHANDLER, ARIZONA  
PUBLIC WORKS & UTILITIES DEPARTMENT**

**CERTIFICATE OF COMPLETION**

<b>PROJECT NAME:</b>	<b>Taxiway B Improvements Phase 1</b>		
<b>CITY PROJECT NO.:</b>	<b>AI2302.401; ADOT No.: E3S4C</b>		
<b><i>If Federally Funded:</i></b>			
<b>FEDERAL NO.:</b>		<b>ADOT NO:</b>	

*(This section to be completed by Prime)*

I HEREBY CERTIFY THAT ALL GOODS AND/OR SERVICES REQUIRED BY CITY OF CHANDLER FOR THIS PROJECT HAVE BEEN DELIVERED IN ACCORDANCE WITH THE AGREEMENT DOCUMENTS AND BID SPECIFICATIONS AND ALL ACTIVITIES REQUIRED BY THE AGREEMENTOR UNDER THE AGREEMENT HAVE BEEN COMPLETED AS OF THE COMPLETION DATE LISTED HERE:

<b><u>FINAL ACCEPTANCE DATE:</u></b>	
--------------------------------------	--

**PRIME CONTRACTOR:**

<b>FIRM NAME:</b>			
<b>PRINCIPAL:</b>			
<b>TITLE:</b>			
<b>SIGNATURE:</b>		<b>DATE:</b>	

---

**CERTIFIED BY** **[INSERT NAME AND TITLE OF PARTY THAT OVERSEES CONSTRUCTION]:**

<b>FIRM NAME:</b>			
<b>SIGNATURE:</b>		<b>DATE:</b>	

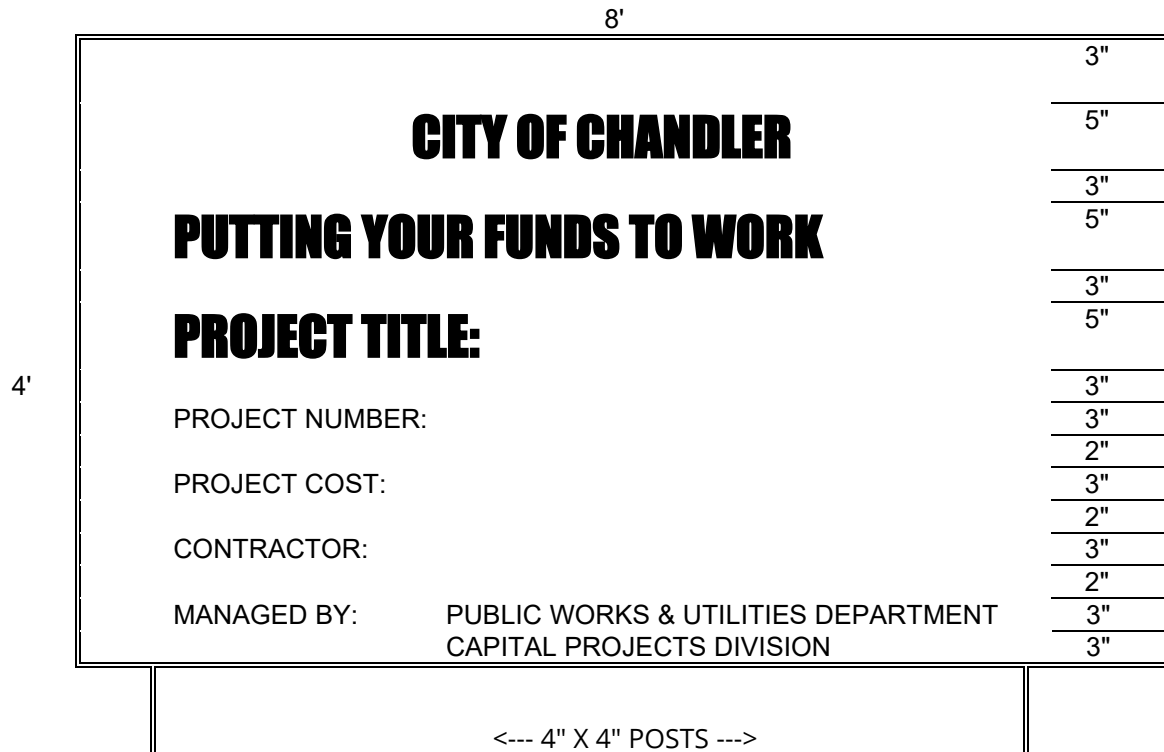
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**PROJECT ACCEPTED BY CITY OF CHANDLER:**

<b>NAME:</b>			
<b>SIGNATURE:</b>		<b>DATE:</b>	



**CONSTRUCTION SIGN DETAIL**



NOTES:

SIGN(S) MUST BE FURNISHED AND ERECTED PRIOR TO COMMENCEMENT OF CONSTRUCTION. POSTS MUST BE ANCHORED A MINIMUM OF TWO FEET INTO THE GROUND. BOTTOM OF SIGN MUST BE A MINIMUM OF FOUR FEET ABOVE THE GROUND.

TYPICAL PROJECT IDENTIFICATION SIGN FOR GENERAL PROJECTS MUST BE NON-REFLECTORIZED GREEN BACKGROUND, AND NON-REFLECTORIZED WHITE LETTERS AND NUMERALS.

ONE SIGN MUST BE ERECTED FOR BUILDINGS AND OTHER LIMITED AREA SINGLE SITES. FOR MULTIPLE SITES, ONE SIGN MUST BE ERECTED AT EACH SITE.

FOR LINEAR PROJECTS ONE HALF MILE OR LONGER, PLACE ONE SIGN AT EACH END OF THE PROJECT.

## **COST OF THE WORK**

**(APPLICABLE SOLELY TO CONSTRUCTION MANAGER AT RISK AND JOB ORDER CONTRACTING)**

### **SECTION 1 – COSTS TO BE REIMBURSED**

#### **1.1 Cost of the Work**

The term Cost of the Work will mean costs necessarily incurred by Contractor in the proper performance of the Work. Such costs must be at rates not higher than the standard paid at the place of the Project except with prior consent of City. The Cost of the Work will include only the items set forth in this Section 1.

#### **1.2 Labor Costs**

- 1.2.1 Wages of construction workers directly employed by the Contractor to perform the construction of the Work at the site or, with City's approval, at off-site workshops. Cost to be reimbursed will be the actual wages paid to the individuals performing the work.
- 1.2.2 Wages or salaries of the Contractor's supervisory and administrative personnel when stationed at the site with City's approval. No Contractor personnel stationed at the Contractor's home or branch offices will be charged to the Cost of the Work. Non-field office based Contractor management and support personnel are expected to provide service and advice from time to time throughout the job and his/her time devoted to Project matters is considered to be covered by the Contractor's Fee.
- 1.2.3 Wages and salaries of Contractor's supervisory or administrative personnel who would normally be stationed at the field office in accordance with Section 1.2.2 but who become engaged, at factories, workshops or on the road, in expediting the production or transportation of materials or equipment required for the Work, but only for that portion of his/her time required for the Work. Employee bonuses and/or costs associated with Employee Stock Ownership Plans ("ESOP") will not be considered reimbursable labor or labor burden costs and will be considered non-reimbursable costs considered to be covered by the Contractor's Fee.
- 1.2.4 Costs paid or incurred by Contractor for taxes, insurance, contributions, assessments and benefits required by law or collective bargaining agreements and, for personnel not covered by such agreements, customary benefits such as sick leave, medical and health benefits, holiday, vacations and pensions, provided such costs are based on wages and salaries included in the Cost of the Work under Subparagraphs 1.2.1 through 1.2.3.
  - 1.2.4.1 Cost of the Work will include the actual net cost to Contractor for worker's compensation insurance attributable to the wages chargeable to the Cost of Work per this Agreement. The actual net cost of worker's compensation must take into consideration all cost adjustments due to experience modifiers, premium discounts, policy dividends, retrospective rating plan premium adjustments, assigned risk pool rebates, any applicable weekly maximums, etc. Contractor may charge an estimated amount for worker's compensation insurance costs, but will make appropriate cost adjustments to actual costs within 45 days of receipt of actual cost adjustments from the insurance carrier.

- 1.2.4.3 Overtime wages paid to salaried personnel (if approved in advance in writing by City) will be reimbursed at the actual rate of overtime pay paid to the individual. No time charges for overtime hours worked on the Project will be allowed if the individual is not paid for the overtime worked.
- 1.2.4.4 Any overtime premium or shift differential expense to be incurred by Contractor for hourly workers will require City's advance written approval before the incremental cost of the overtime premium or shift differential will be considered a reimbursable cost. If the Contractor is required to work overtime as a result of an inexcusable delay or other coordination problems caused by the Contractor or anyone he/she is responsible for, the overtime premium and/or shift differential expense portion of the payroll expense and related labor burden costs will be considered as cost not to be reimbursed.
- 1.2.4.5 Reimbursable labor burden costs will be limited to payroll taxes, worker's compensation insurance, the employer's portion of union benefit costs for union employees working on the Project, and the actual verifiable fringe benefit costs incurred by Contractor for non-union individuals working on the Project subject to the following maximum percentages for the following reimbursable non-union fringe benefit costs. The following maximums (as a percentage of reimbursable actual wages by individual) will apply for each of the following types of fringe benefit costs specifically attributable to each of the non-union personnel working on the Project:

• Medical Insurance, Dental, Life & AD&D Insurance:	12.00%
• Holiday, vacation and other paid time not worked:	10.00%
• Pension Plan Contributions to Vested Employee Account, Simplified Employee Pension Plans, or 401K matching plans (Note: ESOP related costs are covered by the Contractor Fee)	10.00%

For non-union personnel, no other fringe benefit costs (other than the three specific categories listed immediately above, will be considered reimbursable Cost of Work. Any labor burden costs that are in excess of the amounts considered reimbursable or are otherwise not considered reimbursable under the terms of this agreement are intended to be covered by the Contractor Fee.

### **1.3 Subcontract Costs**

- 1.3.1 Payments made by Contractor to Subcontractors in accordance with the requirements of the subcontracts.
- 1.3.2 For Scope of Work Bid Packages typically performed by Subcontractors, Contractor may "self- perform" such work on an actual cost basis subject to an agreed upon Guaranteed Maximum Price for the "self-performed work". The Contractor must, unless agreed to by City in writing, bid his/her proposed guaranteed Maximum Price for the work to be "self-performed" against at least three other interested trade Contractors. All savings under any such Subcontract for "self-performed work" must be applied to reduce the Cost of Work under the Agreement and the Guaranteed Maximum Price. For purposes of defining "self-performed work" subject to this provision, any division of Contractor, or any separate Contractor or Subcontractor that is partially owned or wholly owned by the Contractor or any of his/her employees or employee's relatives will be considered a related party entity and will be subject to this provision regarding "self-performed work". No self-performed work will

be allowed to be performed on a Fixed Price basis.

- 1.3.3 Contractor (with respect to its Suppliers, Subcontractors and all lower tier Subcontractors) must provide City advance written notice and must obtain City's approval for any proposed Subcontract Change Order, Material Purchase Order, or other financial commitment in an amount in excess of \$5,000 prior to placing such order or entering into such agreement (regardless of whether or not any such commitment will affect the prime Agreement Guaranteed Maximum Cost). It is agreed that sums applicable to any Subcontract Change Order, Purchase Order or other financial commitment entered into in violation of the above notice and approval requirement will not be included in the amounts owing to Contractor, Subcontractors or Suppliers whether as Costs of the Work or as reasonable termination costs in the event of termination.

**1.4 Costs of Material and Equipment Incorporated in the Completed Construction**

- 1.4.1 Costs, including transportation and storage, of materials and equipment incorporated or to be incorporated in the completed construction.
- 1.4.2 Costs of materials described in the preceding Subparagraph 1.4.1 in excess of those actually installed to allow for reasonable waste and spoilage. Unused excess materials, in any, will become City's property at the completion of the Work or, at City's option, may be sold by the Contractor. Any amounts realized from such sales must be credited to City as a deduction from the Cost of Work.
- 1.4.3 Proceeds from the sale of recyclable materials, scrap, waste, etc. will be credited to job cost.

**1.5 Costs of Other materials and Equipment, Temporary Facilities and Related Items**

- 1.5.1 Costs, including transportation and storage, installation, maintenance, dismantling and removal of materials, supplies, temporary facilities, machinery, equipment and hand tools not customarily owned by construction workers, that are provided by the Contractor at the site and fully consumed in the performance of the Work; and cost (less salvage value) of such items if not fully consumed, whether sold to others or retained by Contractor. Cost for items previously used by Contractor will mean fair market value.
- 1.5.2 Rental charges for temporary facilities, machinery, equipment, and hand tools not customarily owned by construction workers that are provided by Contractor at the site, whether rented from Contractor or others, and costs of transportation, installation, minor repairs and replacements, dismantling and removal thereof. Rates and quantities of equipment rented will be subject to City's prior written approval.
- 1.5.2.1 The Projected usage for each piece of equipment to be rented for use on the Project and the estimated total rentals must be considered by Contractor before the piece of equipment is rented so that an appropriate rent versus buy decision can be made. Purchased equipment must be considered "job owned". At the completion of the Project, Contractor must transfer title and possession of all remaining job-owned equipment to City, or Contractor may keep any such equipment for an appropriate fair market value credit to job cost, which will be mutually agreed to by City and Contractor.
- 1.5.2.2 Each piece of equipment to be rented must have hourly, daily, weekly and monthly rates and

the most economical rate available will be reimbursed based on the circumstances of actual need and usage of the piece of equipment while it is stationed at the jobsite. When the piece of equipment is no longer needed for the work, no rental charges will be reimbursed if the piece of equipment remains at the jobsite for the convenience of Contractor.

### **1.5.2.3 Equipment Rental Rates**

1.5.2.3.1 Compensation for equipment used on the Project will be paid in accordance with the Equipment Plan submitted by Contractor in the accepted GMP Proposal and no payments will be made in excess of the rates set forth in the Equipment Plan, or actual documented costs, whichever is less.

1.5.2.3.2 All equipment rental rates and costs are subject to City's right to audit when submitted as part of Equipment Plan and/or at any time during the Project.

1.5.2.4 The aggregate rentals chargeable for each piece of Contractor owned tools or equipment must not exceed 50% of the fair market value of such equipment at the time of its commitment to the Work. The original purchase price and date of purchase of the equipment will be documented with a copy of the purchase invoice for the piece of equipment. Such aggregate limitations will apply and no further rentals will be charged even if a piece of equipment is taken off the job and is later replaced by a similar piece of equipment. For purposes of computing the aggregate rentals applicable to aggregate rental limitations, rental charges for similar pieces of equipment will be combined if the pieces of equipment were not used at the same time.

1.5.2.5 Fair market value for used material and equipment as referred to in the Agreement Documents will mean the estimated price a reasonable purchaser would pay to purchase the used material or equipment at the time it was initially needed for the job. Note: This is usually lower than the price a reasonable purchaser would pay for similar new construction material or construction equipment.

1.5.2.6 All losses resulting from lost, damaged or stolen tools and equipment will be the sole responsibility of Contractor, and not City, and the cost of such losses will not be reimbursable under the Agreement.

1.5.2.7 Contractor will be required to maintain a detailed equipment inventory of all job-owned equipment (either purchased and charged to job cost or job-owned through aggregate rentals) and such inventory must be submitted to City each month. For each piece of equipment, such inventory should contain at a minimum (1) original purchase price or acquisition cost (2) acquisition date (3) approved Fair Market Value at the time the piece of equipment was first used on the job and (4) final disposition.

1.5.2.8 All costs incurred for minor maintenance and repairs will be reimbursed at actual cost. Such costs include routine and preventative maintenance, minor repairs and other incidental costs. Repairs and/or replacement of a capital nature are considered to be covered by the rental rates. Major repairs and overhauls are not considered routine and ordinary; consequently such costs are not reimbursable and are intended to be covered by the rental rates.

1.5.3 Costs of removal of debris from the Site.

- 1.5.4 Costs of document reproductions, facsimile transmissions and long-distance telephone calls, postage and parcel delivery charges, telephone service at the site and reasonable petty cash expenses of the site office.
- 1.5.5 That portion of the reasonable expenses of Contractor's personnel incurred while traveling in discharge of duties connected with the Work.
  - 1.5.5.1 No travel expenses will be reimbursed to Contractor's representatives unless Project related travel required them to travel to a destination more than 100 miles from the Project location. Any travel involving airfare will require advance written approval by an authorized City's representative.
- 1.5.6 Costs of materials and equipment suitably stored off the site at a mutually acceptable location, if approved in advance by the City.
- 1.5.7 Reproduction costs will be the actual costs of reproduction subject to a maximum of five cents (\$.05) per square foot for prints and a maximum of five cents (\$.05) per 8 ½ by 11-inch page for offset print or photo copied agreement documents, specifications, etc. Telephone costs will be the actual costs paid to the third party telephone company for the field office telephone.

## **1.6 Miscellaneous Costs**

- 1.6.1 That portion of insurance and bond premiums that can be directly attributed to the Agreement. The City will reimburse Contractor for contractually required bond at time of first pay application for GMP and Cost-Based Agreements upon receipt of proof of payment from the Contractor. If the Contractor completes Work for less than the Agreement Price, Contractor must credit the City a pro-rated amount for the unused portion of the bond payment
  - 1.6.1.1 Contractor's actual cost for insurance will be considered to be included within the Maximum limit for General Conditions Costs. All premiums for any insurance and bonds required for the Project must reflect the net actual costs to Contractor after taking into consideration cost adjustments due to experience modifiers, premium discounts, policy dividends, retrospective rating plan premium adjustments, assigned risk pool rebates, refunds, etc.
  - 1.6.1.2 The amount to be reimbursed to Contractor for all contractually required insurance will be actual costs not to exceed a total of 2% of the Agreement Value, unless Contractor establishes to City's satisfaction that the actual cost is higher and City agrees to such actual higher cost in writing. If Contractor's cost of contractually required insurance is greater than the amount agreed to be reimbursed per this Agreement Provision, the difference will be considered to be covered by the Contractor's Fee. The City will reimburse Contractor for contractually required insurance on a monthly basis for GMP and Cost-Based Agreements. If Contractor can demonstrate substantial savings by paying for all insurance in advance, the City may agree to reimburse all insurance costs at time of first pay application for GMP and Cost-Based Agreements with proof of payment from Contractor.
- 1.6.2 Sales, use or similar taxes imposed by a governmental authority that are related to the Work.

- 1.6.3 Fees and assessments for the building permit and for other permits, licenses and inspections for which Contractor is required by the Agreement Documents to pay.
- 1.6.4 Fees of laboratories for tests required by the Agreement Documents, except those related to defective or nonconforming Work and which do not fall within the scope of ¶ 1.7.3 below.
- 1.6.5 Royalties and license fees paid for the use of a particular design, process or product required by the Agreement Documents; the cost of defending suites or claims for infringement of patent rights arising from such requirement of the Agreement Documents; and payments made in accordance with legal judgments against Contractor resulting from such suites or claims and payments of settlements made with City's consent. However, such costs of legal defenses, judgments and settlements must not be included in the calculation of the Contractor's Fee or subject to the Guaranteed Maximum Price.
- 1.6.6 Data processing costs related to the Work. However, any such data processing costs will be limited to the cost of personal computer hardware used at the field office in the normal day to day administration, management and control of the Project. The aggregate charges for any such hardware must not exceed the Fair Market Value of the hardware at the time it was brought to the field office. If the total charges for any particular piece of hardware reach an amount equal to the Fair Market Value, that particular piece of hardware must be turned over to City whenever it is no longer needed for the Project. If Contractor elects to keep the particular piece of hardware, the job costs must be credited with a mutually agreeable amount which will represent the Fair Market Value of the particular piece of hardware at the time it was no longer needed for the job. Software or other costs associated with the use of computer programs will not be considered to be a reimbursable cost and will be considered to be covered by the Contractor's Fee.
- 1.6.7 Deposits lost for causes other than Contractor's negligence or failure to fulfill a specific responsibility to City as set forth in the Agreement Documents.
- 1.6.8 Legal, mediation and arbitration costs, including attorneys' fees, other than those arising from disputes between City and Contractor, reasonably incurred by Contractor in the performance of the Work and with City's prior written approval; which approval will not be unreasonably withheld.
- 1.6.9 Expenses incurred in accordance with Contractor's standard personnel policy for relocation and temporary living allowances of personnel required for the Work, if pre-approved by City in writing. If City authorizes the reimbursement of relocation costs, the reimbursable relocation expenses will be limited to a maximum of \$50,000 per person. Any relocation cost incurred by Contractor in excess of the amount reimbursed by City will be considered to be covered by the Contractor's Fee.

## **1.7 Other Costs and Emergencies**

- 1.7.1 Other costs incurred in the performance of the Work if and to the extent approved in advance in writing by City.
- 1.7.2 Costs due to emergencies incurred in taking action to prevent threatened damage, injury or

loss in case of an emergency affecting the safety of persons and property.

- 1.7.3 Costs of repairing or correcting damaged or nonconforming Work executed by Contractor, Subcontractors or Suppliers, provided that such damaged or nonconforming Work was not caused by negligence or failure to fulfill a specific responsibility of Contractor and only to the extent that the cost of repair or correction is not recoverable by Contractor from insurance, sureties, Subcontractors or Suppliers.

## **1.8 Related Party Transactions**

- 1.8.1 The term “related party” will mean a parent, subsidiary, affiliate or other entity having common ownership or management with Contractor; any entity in which any stockholder in, or management employee of, Contractor owns any interest in excess of ten percent in the aggregate; or any person or entity which has the right to control the business or affairs of Contractor. The term “related party” includes any member of the immediate family of any person identified above.
- 1.8.2 If any of the costs to be reimbursed arise from a transaction between Contractor and a related party, Contractor must notify City in writing of the specific nature of the contemplated transaction, including the identity of the related party and the anticipated cost to be incurred, before any such transaction is consummated or cost incurred. If City, after such notification, authorizes in writing the proposed transaction, then the cost incurred will be included as a cost to be reimbursed, and Contractor must procure the Work, equipment, goods or service from the related party, as a Subcontractor. If City fails to authorize the transaction, Contractor must procure the Work, equipment, goods or service from some person or entity other than a related party.

## **SECTION 2 – COSTS NOT TO BE REIMBURSED**

- 2.1 The Cost of Work must not include:
- 2.1.1 Salaries and other compensation of Contractor’s personnel stationed at Contractor’s principal office or offices other than the site office, except as specifically provided in Subparagraphs 1.2.2 and 1.2.3.
- 2.1.2 Expenses of Contractors’ principal office and offices other than the site office.
- 2.1.3 Overhead and general expenses, except as may be expressly included in Section 1.
- 2.1.3.1 Costs of Contractor’s home office computer services or other outside computer processing services will be considered overhead and general expense. Accordingly, Contractor should not plan to perform any such computer related services or alternatives at the field office when such services or functions can be performed at Contractor’s home or branch offices, or other outside service locations.
- 2.1.4 Contractor’s capital expenses, including interest on Contractor’s capital employed for the Work.
- 2.1.5 Rental costs of machinery and equipment, except as specifically provided in subparagraph 1.5.2.



- 2.1.6 Except as provided in Subparagraph 1.7.3 of the Agreement, costs due to the negligence or failure to fulfill a specific responsibility of Contractor, Subcontractors and Suppliers or anyone directly or indirectly employed by any of them or for whose acts of them may be liable.
- 2.1.7 Any cost not specifically and expressly described in Section 1.
- 2.1.8 Costs, other than costs included in Change Orders approved by City that would cause the GMP to be exceeded.

### **SECTION 3 – DISCOUNTS, REBATES, REFUNDS AND SAVINGS**

- 3.1 Cash discounts obtained on payments made by Contractor will accrue to City if (1) before making the payment, Contractor included them in an Application for Payment and received payment therefore from City, or (2) City has deposited funds with Contractor with which to make payments; otherwise, cash discounts will accrue to Contractor. Trade discounts, rebates, refunds and amounts received from sales or surplus materials and equipment will accrue to City, and Contractor must make provisions so that they can be secured.
- 3.1.1 Cost of the Work will be credited with all insurance policy discounts, performance and payment bond rebates or refunds, refunds or return premiums from any Subcontractor default insurance, refunds or rebates from any Contractor controlled insurance programs applicable to the Project, merchandise rebates of any nature, refunds of any nature, insurance dividends; and a portion of any volume rebates or free material credits earned with purchase of material or other goods and services charged to the job.
- 3.1.2 “Cash” discounts which may accrue to Contractor will be limited to a maximum of 1.5% of invoice cost. Any portion of “Cash” discounts greater than 1.5% will automatically accrue to City if Contractor is eligible to take advantage of the discounts.
- 3.2 Amounts that accrue to City in accordance with the provisions of Paragraph 3.1 will be credited to City as a deduction from the Cost of the Work.
- 3.3 Any and all savings on the GMP, or any separately guaranteed items comprising the GMP, will belong to City, subject to any express right in the Agreement for Contractor to share in savings. Savings are subject to City’s right to audit, and may be audited separately.

### **SECTION 4 – GENERAL CONDITIONS COSTS**

- 4.1 General Conditions Costs may include, but are not limited to, the following types of costs incurred by Contractor during construction of the Work to the extent they are reimbursable Costs of the Work as delineated above: payroll costs for Work conducted at the site, payroll costs for the superintendent and full-time general foremen, payroll costs for management personnel resident and working on the site workers not included as direct labor costs engaged in support (e.g. loading/unloading, clean-up, etc.), administrative office personnel, costs of offices and temporary facilities including office materials, office supplies, office equipment, minor expenses, utilities, fuel, sanitary facilities and telephone services at the site, costs of liability insurance premiums not included in labor burdens for direct labor

costs, costs of bond premiums, costs of consultants not in the direct employ of Contractor or Subcontractors, fees for permits and licenses.

- 4.2 General Conditions Costs may be paid on a percentage of the Agreement Price or on a lump/stipulate sum basis as set forth in the Agreement. All costs included in the General Conditions Costs will not be separately invoiced to or paid by City.
- 4.3 The total amount of General Conditions Costs for the Work may be divided by the number of days allowed for performance of the Work, to determine a fixed daily rate for General Conditions Costs that may be used in computing the General Conditions Costs allocated to any period of time, or for any adjustments in the General Conditions Costs agreed to in writing by City.

## **LANDSCAPE ESTABLISHMENT PERIOD**

### **Section 1 – Description and General**

Contractor is in direct control of work performed under the Landscape Establishment Period. If work is subcontracted, a representative of the Contractor will be present at the site of the work for all hours that the subcontractor works. Subcontracting of Landscape Establishment work will be permitted for weed eradication with herbicides, because of special licensing. A licensed temporary service may be used to supply labor to Contractor if Contractor has received approval from City Representatives. Contractor will submit the required subcontract documentation.

Contractor must provide adequate personnel to accomplish the required maintenance of the plant materials at intervals acceptable to City Representatives.

If not healthy at the end of the maintenance period, the maintenance must be continued until the plant material is approved by City.

#### **1.1 Time and Schedule**

Unless otherwise expressly agreed to in writing by City, the Landscape Establishment Period will be per General Conditions Section 6.5.4.

#### **1.2 Planted Stock and Seeding Establishment**

- 1.2.1 Tree planting and staking must be per City of Chandler Standard Detail C-801.
- 1.2.2 All trees will stand erect on their own without stakes when brought to this site. If the tree cannot stand on its own when nursery stakes are removed, the tree will be removed and replaced.

#### **1.3 Pre-Emergent Herbicide and Weed Control**

- 1.3.1 Contractor will provide three applications of an approved pre-emergent herbicide on all unpaved areas of the project, as directed by City Representatives, to control weed growth in all areas of the project. The number of applications may be increased as directed by the City Representative, and at no additional cost to City, if the City Representative deems additional applications are required to control weed growth.
- 1.3.2 Application sequence will be approved in advance by City. The first application of pre-emergent will be completed prior to the application of Decomposed Granite and will be included with the cost of the Decomposed Granite as specified and part of the Construction Phase portion of work. The second application of pre-emergent will be completed after installation of the Decomposed Granite and no later than half-way through the Landscape Establishment Period. The third and final application of pre-emergent will be applied 15 days prior to completion of the Landscape Establishment portion of the project. The second and third pre-emergent applications will be included with the cost of Landscape Establishment. Watering will be completed in accordance with the manufacturer's recommendations, as included and as related to each application.
- 1.3.3 The pre-emergent herbicide will be applied in accordance with the Technical Specifications and the recommendations of the pre-emergent herbicide manufacturer, as approved by City Representatives.

- 1.3.4 The control of weeds will be accomplished by the use of herbicides. Manual removal of weeds will be required, after herbicides have taken affect.
- 1.3.5 Contractor is responsible for the removal and disposal of all trash and debris that during the Landscape Establishment Period. Contractor will keep the project in a neat and orderly manner during the duration of the Landscape Establishment Period.

#### **1.4 Water**

The water used during Landscape Establishment to properly maintain the plant material will be furnished by City, at designated sources from within the project limits, at no charge to Contractor. Contractor will be responsible for all equipment, materials and labor necessary to load, transport and unload water for watering purposes.

#### **1.5 Plant Material Replacements**

The plant material replacement will be considered as included in the work for Landscape Establishment, and will be made at no charge to the City.

- 1.5.1 Shrub and Plant Replacement - During the second half of the Landscaping Establishment period, Contractor will provide, where required, plant replacements as follows:

<b><u>Original Size</u></b>	<b><u>Replacement Size</u></b>
1 gallon	5 gallon
5 gallon	15 gallon
15 gallon	24-inch box
36-inch box	48-inch box

- 1.5.2 Tree Replacement – During the second half of the Landscape Establishment Period, Contractor will provide plant material replacements for existing plants that die as follows:

<b><u>Existing Plant Material Sizes</u></b>	<b><u>Replacement Size</u></b>
Trees:	
2-inch Caliper	24-inch box
4-inch Caliper	36-inch box
6-inch Caliper and greater	54-inch box
Shrubs:	
All Existing Shrubs	15 gallon

#### **1.6 Measurement and Payment**

See Technical Specifications for Measurement Payment provisions.

## **EXHIBIT C**

### **TECHNICAL SPECIFICATIONS**

# PROJECT SPECIFICATIONS

## Chandler Municipal Airport Taxiway 'B' Improvements Phase 1: Taxiway 'L' to Taxiway 'N'

City Project No: AI2302.401  
ADOT Project No: E3S4C  
Dibble Project No.: 1021015.11

Prepared For:  
City of Chandler

September 27, 2024



# PROJECT SPECIFICATIONS

Chandler Municipal Airport

## Taxiway 'B' Improvements Phase 1: Taxiway 'L' to Taxiway 'N'

CHD Project No: AI2302.401

ADOT Project No: E3S4C

Dibble Project No.: 1021015.11

Prepared For:

Chandler Municipal Airport  
2380 S Stinson Way  
Chandler, AZ 85286

September 27, 2024

Duane Dana, PE  
Senior Project Manager

***Dibble***



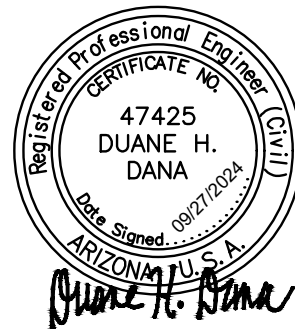
**CITY OF CHANDLER**  
**CHANDLER MUNICIPAL AIRPORT**  
**Taxiway 'B' Improvements Phase 1**

City Project No.: AI2302.401

ADOT Project No.: E3S4C

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## DIVISION I

### SPECIAL PROVISIONS

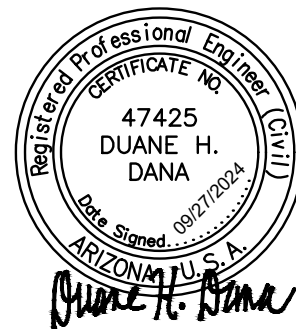
**CITY OF CHANDLER**  
**Chandler Municipal Airport**  
**Taxiway 'B' Improvements Phase 1**

City Project No: AI2302.401

ADOT Project No: E3S4C

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## SECTION 50 UTILITIES AND EXISTING FACILITIES

### 50.01 General

This item shall govern the field location of all underground existing utilities in areas to be improved, to avoid conflicts with proposed surface or underground improvement. Work under this section shall include, but not be limited to, the location of all underground facilities. Underground facilities means any item that is buried or placed below ground for use in connection with the storage or conveyance of water, sewage, electronic, telephone or telegraphic communications, electric energy, oil, gas or other substances, and shall include, but not be limited to pipes, sewers, conduits, cables, valves, lines, wires, manholes, attachments and those portions of poles and their attachments below ground, including electrical and communication ducts, airfield lighting and control cables, fiber optic lines, storm drains, electrical and telephone lines. The Contractor shall employ a private utility location service to locate the existing Owner and non-Owner utilities prior to starting the work. The Contractor shall pothole and use prudent care when excavating and locating said utilities.

The Contractor shall comply with the State requirements regarding excavation and underground utilities per A.R.S., Chapter 2, Article 6.3. and Sections 40.360.31 and other pertinent Sections of the Blue Stake Law. The Airport is not a member, but has distribution systems for gas, electrical, water, and sewer on the site. The Contractor shall be responsible for locating all Owner and non-Owner utilities.

The Contractor's attention is directed to the following Arizona Revised Statutes:

**a. ARS 40-360.22.** Excavations, determining location of underground facilities; providing information. This statute requires that no person shall begin excavation before the location and marking are complete or the excavator is notified that marking is unnecessary and requires that upon notification, the Owner of the facility shall respond as promptly as practical, but in no event later than two (2) working days. This section is not applicable to an excavation made during an emergency that involves danger to life, health or property if reasonable precautions are taken to protect underground facilities.

**b. ARS 40-360.23.** Making excavations in careful, prudent manner; liability for negligence. This statute states that obtaining information as required does not excuse any person making any excavation from doing so in a careful and prudent manner, nor shall it excuse such persons from liability for any damage or injury resulting from his negligence.

**c. ARS 40-360.28.** Civil penalty; liability. If the Owner or operator fails to locate, or incorrectly locates the underground facility, pursuant to this article, the Owner or operator becomes liable for resulting damages, costs and expenses to the injured party.

**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.** The Contractor shall be responsible for any damage done to public or private property and such damage shall be repaired at the Contractor's expense.

Location of any underground utility lines may be field verified by calling the Blue Stake Center (Arizona 811) telephone number 811 or create a ticket online using E-Stake at:

<https://exactix.arizona811.com/>

The Contractor is required to call at least two (2) working days before digging. The Contractor shall locate all utilities including those that Blue Stake will not locate.

The Contractor is to protect all existing facilities during construction. The Contractor shall notify the appropriate Utility Company or agency of any construction that may affect their facilities.

Measurement for "Location of Underground Utilities" shall be by the lump sum for subcontractors (i.e., Utility Designation/Potholing contractor) to complete utility locating in the project area.

Payment for location of underground utilities, measured as prescribed above, shall be paid based on the cost of completed work. Such payment shall be full compensation for furnishing all labor, equipment tools and materials and for all designation, preparation, excavation, backfilling and placing of materials; and for all incidentals necessary. Payment for the cost of each utility location will not be made until survey data has been submitted and approved by the Engineer.

Payment will be made under:

No. 4, Spec No. SP-50.01.1      Location of Underground Utilities – per Allowance

## **50.02 Water for Construction Purposes**

The Contractor, at his expense, shall provide all water required for, and in connection with, the work to be performed. The Contractor shall remove all temporary waterlines installed, after completion of the work, if directed to do so by the Engineer.

It is the Contractor's responsibility to identify the water source and its compatibility, storage, and costs for all water requirements for this project. The Contractor must submit a water source and its intended use to the Engineer for approval. No direct payment will be made for construction water. The cost thereof shall be included in other items for which direct payment is made.

## **50.03 Electrical Power**

All power for lighting, operation of Contractor's plant or equipment, or for any other use as may be required in the execution of the work to be performed under the provision of these Contract Documents shall be provided by the Contractor at his expense. The Contractor shall remove all temporary electrical facilities installed, after completion of the work, if ordered to do so by the Engineer.

## **50.04 Sanitary Facilities**

The Contractor shall furnish temporary sanitary facilities at the site, as provided herein, for the needs of all construction workers and other performing work or furnishing services on the Project. Sanitary facilities shall be of reasonable capacity, properly maintained throughout the construction period, and obscured from public view to the greatest practical extent. If toilets of the chemically treated type are used, at least one toilet will be furnished for each 20 men. Contractor shall enforce the use of such sanitary facilities by all personnel at the site.

## **END SECTION 50**

## **SECTION 60      OPERATIONS, SAFETY AND SECURITY**

### **60.01 Definitions**

**a.    Air Carrier Aircraft**

An aircraft with a seating capacity of more than 5 passengers that is being operated by an air carrier.

**b.    Air Carrier Operation**

The takeoff and landing of an air carrier aircraft and includes the period of time from 15 minutes before and until 15 minutes after the takeoff or landing.

**c.    Air Operations Area (AOA)**

Air operations area, paved or unpaved, is any area of the airport used for or intended for landing, takeoff, or surface maneuvering of aircraft including its associated runway, taxiway, or apron.

**d.    Airfield Operations Specialist**

CHD employee who monitors activities within the Airport Restricted Areas. Operations Specialists ensure a safe and secure operating environment is maintained on the airfield.

**e.    Airport Marking Aids**

Marking used on runway and taxiway surfaces to identify a specific runway, a runway threshold, a centerline, a hold line, etc. A runway should be marked in accordance with its present usage such as: visual, non-precision instrument, precision instrument.

**f.    Construction**

The presence and movement of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft.

**g.    Escort**

A person authorized by CHD to accompany contractor personnel within the Airport Restricted Area. The escort shall accompany or monitor the activities of an individual(s) in a manner sufficient to take responsive action in a sized area approved by the Engineer. A proper escort is defined as maintaining visual monitoring, within reasonable voice range and being able to react to the actions of those under escort.

**h.    FAA**

The Federal Aviation Administration, a branch of the U.S. Department of Transportation that regulates aviation and airport safety and certification.

**i.    FOD**

Foreign Object Debris/Damage, meaning any object that is potentially hazardous to aircraft.

**j.    General Aviation**

That portion of civil aviation which encompasses all facets of aviation except air carriers holding a certificate of public convenience and necessity from a Civil Aeronautics Board and Large aircraft commercial operators.

**k. Haul Route**

A specified path created for vehicles to maneuver within the Airport Restricted Area to/from a work site. Haul routes are subject to the approval of the Engineer in accordance with the Contract Documents.

**l. Instrument Landing System (ILS)**

An electronic visual approach guidance system used by aircraft during landing operations.

**m. 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 ramps and aircraft parking areas (reference 14 CFR part 139).

**n. Navigational Aid (NAVAID)**

An apparatus generally located within the AOA, serving as a guide to aircraft.

**o. Obstruction**

Any object/obstacle exceeding the obstruction standards specified by 14 CFR part 77, subpart C.

**p. Object Free Area (OFA)**

An area on the ground centered on the runway, taxiway, or taxilane 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, *Airport Design*, for additional guidance on OFA standards and wingtip clearance criteria).

**q. Obstacle Free Zone (OFZ)**

The airspace below 150 feet (45m) 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 (refer to AC 150/5300-13 for guidance on OFZs).

**r. Precision Approach Path Indicator (PAPI)**

An airport lighting facility providing vertical visual approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that he/she is "on path" if he sees red/white, "above path" if white/white, and "below path" if red/red.

**s. Restricted Area**

Areas that do not allow access to the general public. These are limited access areas that the Executive Director, the FAA, or commercial aviation business owners have elected to restrict for purposes of security or safety. It is enclosed by a perimeter fence and includes but is not limited to the AOA, perimeter roadways, haul routes, contractor security gate and worksite.

**t. Runway**

A defined rectangular area on a land airport prepared for the landing and takeoff run of aircraft along its length. Runways are normally numbered in relation to their magnetic direction rounded off to the nearest 10 degrees; e.g., runway 16 and runway 34.

**u. Runway End Identifier Lights (REIL)**

Two synchronized flashing lights, one on each side of the runway threshold, which provides rapid and positive identification of the approach end of a particular runway.

**v. Runway Lights/Runway Edge Lights**

Lights having a prescribed angle of emission used to define the lateral limits of a runway. Runway lights are uniformly spaced and the intensity may be controlled or preset.

**w. Runway Safety Area (RSA)**

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.

**x. Safety Area**

A designated area abutting the edges of a runway or taxiway intended to reduce the risk of damage to an aircraft inadvertently leaving the runway or taxiway.

**y. Taxi**

The movement of an airplane under its own power on the surface of an airport.

**z. Taxiway**

A defined surface used by aircraft for transition/movement to and from aircraft parking areas/aprons to runways.

**aa. Taxiway Lights/Taxiway Edge Lights**

Lights having a prescribed angle of emission used to define the lateral limits of a taxiway and are blue in color.

**bb. Threshold Lights**

Fixed green lights arranged symmetrically left and right of the runway centerline, identifying the runway threshold.

**cc. TSA**

The Transportation Security Administration, a branch of the U.S. Department of Homeland Security that oversees aviation security.

**dd. Visual Flight Rules (VFR)**

Rules that govern the procedures for conducting flight under visual conditions. The term "VFR" is also used in the United States to indicate weather conditions that are equal to or greater than minimum VFR requirements.

**ee. Worksite**

Area in which work under contract is being performed, generally starting at the contractor on-site trailer. Airport ID badges must be displayed within the worksite at all times.



## 60.02 Airport Security Requirements

The airport is operated in strict compliance with TSA and Federal Aviation Regulations (FAR), which prohibit unauthorized persons or vehicles in the AOA. Equipment and workmen will be restricted to the work area defined on the plans. Any violation by Contractor's personnel or subcontractors will subject the Contractor to penalties imposed by the TSA, FAA or CHD.

The Contractor shall be responsible for the protection of the construction site, and all work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons. Security measures shall include such additional security fencing, barricades, lighting, and other measures as the Contractor may deem necessary to protect the site.

The Contractor's responsibilities for work areas are as follows:

1. The Contractor shall be held responsible for controlling his employees, subcontractors, and their employees with regard to traffic movement.
2. The Contractor shall rebuild, repair, restore, and make good at his own expense all injuries or damages to any portion of the work occasioned by his use of these facilities before completion and acceptance of his work.
3. The Contractor shall submit to the Engineer in writing a detailed work plan for each construction phase. The work plan shall include, but not be limited to, temporary electrical facilities and paving/seal sequence. This plan shall be submitted 14 calendar days prior to the start of each construction phase. No work within the construction phase may commence until the phase work plan is approved.
4. The Contractor shall submit to the Engineer in writing a plan, by construction phase, for controlling construction equipment and vehicular movements in the Air Operations Area (AOA). This plan shall be submitted at the Pre-Construction Conference. No work may commence until this plan is approved. The Plan must include material haul roads.
5. Any time construction occurs within airport property, the Contractor shall be responsible for assuring that no breeches of airport property occur through his respective construction access gate. Restricted areas are fenced and must remain fenced at all times. The gates will remain closed and locked or a guard will be provided at the Contractor's expense. The Contractor will furnish the guard with a roster of his personnel and ensure that each individual has adequate identification. The duplicate keys for each lock will be turned over to the airport.
  - No person shall enter the Contractor's worksite without authorization. Any person found within the worksite without proper identification as described herein shall be considered unauthorized and shall be removed from the worksite.
  - Persons authorized to provide escorts include CHD staff and designated Contractor supervisors. The number of personnel being escorted shall not exceed ten (10) personnel; this includes vendors, subcontractors, visitors and part-time workers. **Failure to provide an escort can result in loss of escort privileges and fines.**

## 60.03 Airport Safety Requirements

### a. Operating Construction Vehicles on the Airport

No vehicle shall enter the contractor worksite unless the following conditions are met:

- The driver is authorized to access the worksite.
- The driver possesses a valid driver's license.
- The vehicle is properly marked with the company name.
- Vehicle is marked with lighted beacon or checkered flag or under escort.
- Transient haul truck drivers are required to check in with the contractor security guard.

### b. Prohibited Vehicles

The use of motorcycles, bicycles, two-wheeled motor scooters and privately-owned vehicles within the worksite is strictly prohibited.

### c. Vehicle Condition

Vehicles must be in good mechanical condition with operational lights, horn, brakes, and clear visibility from the driver's seat. Trailers and semi-trailers must be equipped with proper brakes so that when disengaged from a towing vehicle, neither aircraft engine blast nor wind will cause them to become free rolling.

### d. Compliance

All traffic within the Airport Restricted Area and/or contractor worksite must comply with any lawful order, signal or direction of any Airport employee. When such traffic is controlled by signs or pavement markings, such symbols shall be obeyed, unless otherwise directed by an officer or agent of the Airport.

### e. Night or Low Visibility Operations

All vehicle headlights, taillights, and running or clearance lights shall be in operational condition. Headlights shall be used at all times.

### f. Construction Vehicle and Equipment Markings

All construction equipment and vehicles shall have flashing amber beacons mounted at the highest point during the nighttime, and a 3' x 3' orange and white checkered flag or a flashing amber beacon during the daytime. All vehicles and equipment on the construction site shall have company designations visibly displayed. No personal vehicles will be allowed in the work area. All construction vehicles and equipment must have the company name and/or logo and vehicle number at least four (4) inches in height on each side of the vehicle.

### g. Operation of Vehicles within the Airport Restricted Area

No vehicle shall operate within the Airport Restricted Area:

- In a careless or negligent manner.
- With disregard of the rights and safety of others.
- At a speed or in a way which endangers persons or property.
- While the driver is under the influence of drugs or alcohol.
- If such vehicle is loaded or maintained as to endanger persons or property.

**h. Speed Limits**

The speed limit on perimeter roads is 25 miles per hour. The speed limit on the haul routes is 15 miles per hour.

**i. Vehicle Accidents**

Each operator of a motor vehicle involved in an accident on the airport that results in damage to property or personal injury shall first contact **9-1-1** and then report it fully to Airport Operations as soon as possible after the accident. The report must include the name and address of the person reporting. Copies of reports taken by City of Chandler are acceptable for incidents that occur in the public areas of the airport.

**j. Hearing Protection**

Contractor personnel working on or adjacent to the AOA are encouraged to wear hearing protection.

**k. Worker Injuries**

In the event of a serious injury requiring medical attention, call **9-1-1** and notify the operator you are at the Chandler Municipal Airport. All injuries must also be reported to Airport Operations as soon as possible.

**l. After Hours Contacts**

The Contractor shall submit to the Engineer a list of personnel who can be contacted 24 hours a day, seven (7) days a week and can respond in a reasonable time frame regarding any possible emergency on the work site. The list must include names, job titles and phone numbers.

**m. Daily Site Inspections**

Prior to the Contractor leaving the worksite for the day, an inspection of the site shall be completed. All discrepancies noted in the inspection must be corrected to the satisfaction of the Engineer prior to the Contractor leaving the worksite.

**n. Deliveries**

All deliveries for the Contractor shall be received by the Contractor. Deliveries will not be accepted by anyone other than the Contractor. CHD and its authorized representatives will not accept or be responsible for deliveries.

**o. Runway and Taxiway Closures**

Taxiway and runway closures require a minimum of:

- Prior notification and coordination in accordance with the Contract Documents.
- Closure requests shall factor in time for unanticipated events such as weather and equipment malfunction.
- Movement area closure schedules must be met. The Contractor shall advise the Engineer immediately of any need to extend a closure.
- Failure to meet a closure schedule may result in fines.
- Barricade lights must be red in color and either steady burn or flashing.
- Strict adherence and coordination with the phasing plans found within the Construction Plans.

- Two Lighted X's shall be provided by the Airport for this project during runway closures. The Contractor is fully responsible to operate and maintain the Lighted X's including the lights and fuel. Lighted X's are required to be placed at the beginning of each nightly closure and removed before reopening the runway. No work can take place within the phase requiring nighttime closures without the Lighted X's being in place and operational.

**q. Haul Routes**

A portion of the haul route is in the City of Chandler Public Right-of-Way and Contractor shall abide by City of Chandler Traffic regulations. Contractor shall maintain access in the vicinity of the haul routes to provide access to the parking lot and CHD vehicles.

Placards will be issued to transient haul trucks (i.e. concrete) upon entry into the Restricted Area by the gate guard.

**r. Cranes or Mobilized Equipment**

All activities involving cranes or mobilized vehicles exceeding 20 feet in height on or near the AOA require 48-hour advance coordination with Airport Operations. The following information is required:

- Location of equipment
- Maximum extendable height
- Duration of use
- Daily hours of operation
- Whether or not the crane can be lowered when not in use

Equipment must be lowered to its stowed height when not in use or as otherwise directed. The **highest point** of each piece of equipment shall be marked by a 3' x 3' orange and white checkered flag. At night and during periods of low visibility, the highest point of the crane must be marked by a red obstruction light. Crews must be prepared to remove equipment promptly if so directed.

**s. Runway Safety Areas**

Construction within the following areas is prohibited, unless required by the Contract Documents and is subject to approval of the Engineer.

- Within 75 feet parallel to an active runway centerline
- Within 39.5 feet parallel to a taxiway centerline
- Within 300 feet of the end of an active runway

**t. Staging & Storage Area**

All contractor materials, equipment and supplies shall be within the contractor's designated staging and storage area. All staging and storage areas shall be marked, debris boxes covered and area kept neat and clean of debris.

For equipment that must remain in the work area, the following conditions must be met:

- Be located outside of the runway/taxiway safety and obstruction free areas.
- Be marked with lighted barricades around the equipment perimeter with a spacing of no more than 10 feet.

- Be coordinated at least 48 hours in advance with the Engineer.
- The highest point of the equipment marked and lit with a red flashing/steady burning omni-directional obstruction light.

**u. Barricades & Lighting**

The perimeters of the actual work areas, all uneven surfaces, mounds and excavations shall be adequately barricaded with vertical panel barricades, low level barricades and/or Type II barricades and lighted with omni-directional flashing red lights to prevent intrusion by taxiing aircraft, equipment and vehicles. Low profile barricades shall be supplemented with flashing high intensity red lights. Low level barricades shall be orange and white in color and shall be a minimum of six (6) feet in length and ten (10) inches in height. All cones and other marking devices must be lighted or equipped with reflectors during periods of darkness as directed by Airport Operations.

The Contractor will be responsible for placing and maintaining the low-profile barricades. The Contractor will provide a 24/7 point of contact capable of responding within one (1) hour to address issues with the barricades.

All barricades and cones must be maintained and kept in proper working order by the Contractor. All burnt out lights or inoperative batteries must be replaced immediately. Barricades and cones must remain upright at all times.

The placement of sandbags on barricades may be required in situations of adverse weather. In addition, the Contractor must keep an adequate supply of extra barricades, lights and batteries on site. Escorts for barricade maintenance must be provided by the Contractor or coordinated in advance with Airport Operations.

Only red, battery-powered or approved solar-powered, omni-directional lights are acceptable within the Restricted Area of the airport.

See Special Provisions Section 60.05 for additional information and barricading requirements.

**v. Trenches and Excavations**

Contractors shall close trenches located within active safety areas at the end of each workday. No open trenches or excavations will be allowed within the following active safety areas without prior coordination and approval with the Engineer:

- Within 75 feet parallel to a runway centerline (trenches/excavations within 75 feet of a runway centerline require a runway closure which is subject to strict controls).
- Within a taxiway object free area.
- Within 1,000 feet of the end of a runway.
- Open trenches not to exceed 500 feet in length at any one time.
- Spoils from excavations are to be placed on the runway/taxiway side that is closest to the trench.
- Spoils length not to exceed 500 feet in length at any one time.
- Spoil height is not to exceed 4 feet or any height that would cause a visual obstruction.

- Spoils not returned to the trench or removed from the worksite are to be properly marked with lighted barricades with a spacing of no more than 8' or that to properly delineate the trench.

**w. Stockpiled Material**

Stockpiled materials are allowed only within the Contractor's designated staging & storage areas.

- Remove daily all stockpiled material from within aircraft movement areas, unless otherwise directed by the Engineer.
- No excavated or stored materials may remain within active runway or taxiway safety areas and object free zones.
- Stockpiled material may be located within the Air Operations Area only upon prior coordination and approval of the Engineer.

**x. Contractor Security Guards**

The following procedures are for Contractor security guards controlling Contractor access gates into the Restricted Areas. Only personnel and vehicles meeting the following conditions will be allowed access within the Airport Restricted Area:

- Authorized contractors and subcontractors with driver endorsement.
- Authorized suppliers and service companies under positive escort.
- Airport vehicles with proper identification.
- Tenant vehicles with the proper identification.
- Transient haul trucks with proper placard displayed.

**y. Haul Trucks**

Transient haul truck drivers are required to check in with the Contractor security guard. The driver shall be issued an orange/white checkered flag to be mounted on the highest point of the truck; and shall be returned to the security guard upon check out. Advise the driver to remain on the marked haul route and follow the appropriate signs to the intended work area. At no time shall a driver unfamiliar with the worksite be allowed to deviate from the marked haul route.

**y. Weapons**

No person, except a peace officer, authorized air carrier employee, airport employee or a member of an armed force of the United States on official duty, shall carry any weapon, explosive, or inflammable material on or about his person, openly or concealed, on airport property. No person shall furnish, give, sell, or trade a weapon on airport property. A weapon includes all those listed in Section 13-3101, Arizona Revised Statutes.

**z. Security Guard Responsibilities**

- Use primary radio or back-up telephone equipment to notify Airport Operations and the Contractor Foreman of any security violation or threat to airport safety. Report any failure of radio or back-up equipment immediately.
- Assure that all authorized Contractor employees or suppliers use designated haul route and staging areas.
- Monitor the Restricted Area access gate at all times and NEVER leave a gate open, unsecured or unattended.

**aa. Contractor Responsibilities**

- The Contractor must maintain and provide to the Engineer a log detailing the contract number, the airfield access point used, and all authorized and anticipated subcontractors and suppliers that will be requiring entry.
- The Contractor must furnish guards with a sufficient number of flags for transient vehicles such as concrete or asphalt trucks entering the Property.
- The Contractor must furnish guards a means of securing the access point should the guard have to leave the area in an emergency.

**60.04 Schedule of Fines**

Due to both the safety and security precautions necessary at CHD and the impact to airport users, failure of the Contractor to adhere to the prescribed requirements/regulations has consequences that may jeopardize the health, welfare and lives of the customers and employees at CHD, as well as the Contractor's own employees. Therefore, if the Contractor is found to be in non-compliance with the security, airfield badging/licensing and airfield safety requirements by either the Owner's personnel or the Engineer or his representatives, the Owner may issue a Notice of Violation (NOV). The Contractor may appeal the NOV; however, appeals must be made in writing, and within four (4) calendar days of the offending incident, to the CHD Project Representative. The appeal shall state, in sufficient detail, why the NOV/circumstance is unwarranted. A final and binding decision on the appeal will be made by Airport Operations within ten (10) working days of receipt of the appeal, and the Contractor will then be notified of this decision in writing. No further appeals to the specific NOV will be considered/accepted. Subsequent fines and/or requirements, if any, will be applied in accordance with the **Schedule of Fines** listed below and the applicable amount will be withheld from the Contractor's monthly payment application following the date of the violation. The Prime Contractor shall be held financially responsible for all NOV's issued to their subcontractors, lower tier subcontractors, or material suppliers associated with this Contract.

Schedule of Fines	
Description Of Fines	Per Person Per Occurrence
Runway or Taxiway Safety Area Incursion	\$1,000
Taxiway Incursion	\$2,500
Runway Incursion	\$2,500
Security Violation	\$2,500
Level 1 Violation of Airport Rules and Regulations	\$250
Level 2 Violation of Airport Rules and Regulations	\$500
Level 3 Violation of Airport Rules and Regulations	\$1,000



## **60.05 Traffic Control, Barricading and Cleanup**

### **General Requirements:**

The Contractor shall submit a Cleanup Plan for approval by the Owner to be followed at the close of each day's work. At a minimum, the Plan shall include an itemized, detailed list of tasks and equipment to be used to properly clear all areas within Runway and Taxiway Safety Areas in accordance with FAA AC 150/5370-2 (latest revision). The Plan shall specifically identify all work to be performed on a daily basis for each Phase of construction identified on the plans. The Plan shall also include the requirement of the Contractor and Engineer to perform a site walk of the entire effected area of construction a minimum of 2 hours before that area is scheduled to be reopened to aircraft traffic to assure that it has been cleaned and cleared of all equipment and debris in accordance with FAA AC 150/5370-2 (latest edition).

The Contractor shall also be responsible for delineating the limits of construction operations consistent with the approved Phasing and Barricading Safety Plan(s) and/or as directed by the Airport. The Contractor shall submit a Phasing and Barricading Safety Plan(s) as required in the Airport's Construction Safety Plan.

The Contractor shall be responsible for providing, the installation of, and the maintenance of barricades and traffic control devices necessary for the control of aircraft, vehicular, and pedestrian traffic. Any requests to modify the approved barricading and phasing plans must be submitted to the City for review and approval.

The Airfield Safety and Security and Barricade/Temporary Fencing and Traffic Control Plans must be submitted by the Contractor at the Pre-Construction Conference.

Measurement and payment for the Airfield Safety and Security Plans identified above shall be considered incidental to the project, and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the work to the satisfaction of the Owner, as shown on the plans or as directed by the Engineer.

### **Barricade Requirements:**

All construction areas shall be delineated with low-profile barricades that meet FAA standards to prevent intrusion by taxiing aircraft, vehicles, or pedestrians, (FAA AC 150/5370-2, latest edition). Low level barricades shall be orange in color with white reflective tape on both sides of the barricade and shall be a minimum of six (6) feet in length and a maximum of ten (10) inches in height, (not including required flagging or lights).

All barricades must be equipped with RED omni-directional lights, either flashing or steady burning, to provide additional visual warning whether during normal daytime and nighttime operations or during periods of reduced visibility due to weather conditions. Lights may be either battery-powered or solar-powered; however, the intensity of the lights must be sufficient to adequately and without ambiguity delineate the construction areas. The Contractor is responsible to maintain all barricade lights in working conditions to the approval of the Airport.

Barricades should include orange or alternating orange and white checkered flags at least 20 inches by 20 inches square and securely fastened to eliminate jet engine ingestion. The barricades shall be installed so that they are always in the extended position and properly oriented. Maximum spacing between barricades shall be eight (8) feet, or as shown on the approved plans, or as directed by the Airport.

The use of frangible hazard markings, such as concrete barriers, railroad ties and/or metal-drum-type barricades is prohibited. For certain non-movement areas, the City may consider the use of Type II or other similar barricades with prior approval.



**a. Non-Movement Areas**

In addition to the general barricade requirements above, for projects that may impact airport business and facilities, it will be necessary to coordinate ingress and egress routes with the City. The Contractor shall coordinate and make provisions, including barricading, to accommodate aircraft movements to and from existing businesses and facilities within the construction area.

**b. Movement Areas**

In addition to the general barricade requirements above, all barricades, temporary markers, and other objects placed and left in safety areas associated with any runway, taxiway, or taxilane must be as low as possible to the ground; of low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted to prevent displacement from prop wash, jet blast, rotor wash, or surface wind.

**Special Requirements:**

- 1.** The Contractor shall be allowed to have a maximum of five (5) red flashing lights out of service at a single time. The Contractor shall be fined \$250 each night that six (6) or more barricade lights are out of service. All fines shall be paid directly to the Airport.
- 2.** The Contractor shall coordinate his construction so that taxiways and runways are open to traffic during weekends to the greatest extent possible consistent with FAA Safety Standards and the Airport's operational requirements.
- 3.** The Contractor shall employ a "designated" person who will be responsible for ensuring that all barricades, signs, barricade lights, and any other traffic control devices are established and maintained in strict compliance with the contract requirements. The designated person shall:
  - a.** Inspect all barricading and traffic control devices on a regular, recurring basis to ensure functionality and compliance with FAA standards.
  - b.** Ensure that existing airport signage and lighting does not conflict or create any confusion with the barricades and traffic control devices and shall immediately bring any conflicting conditions to the attention of the City Inspector.
  - c.** Be available 24 hours a day to maintain all barricades including lights and flags used to delineate construction and hazardous areas in fully operational condition.
  - d.** Ensure that flagmen, when employed, are sufficiently trained to operate safely on the airport.

**Aircraft Movement Area:****a. Vehicle Equipment – Daytime Operations:**

All Contractor vehicles and equipment operating in the AOA during daylight hours must be equipped with either a 3-foot by 3-foot international orange and white checker patterned flag mounted on a staff and secured to the vehicle in such a location as to be visible from all directions or a flashing amber beacon, light bar or similar warning light device mounted on the vehicle in such a location as to be visible from any direction.

**b. Vehicle Equipment –Escort Operations:**

Contractor vehicles may be used to escort a maximum of three (3) other vehicles onto AOA, (only for a short period of time). The vehicle providing the escort must lead and is responsible for the trailing vehicle(s).

When any vehicle other than those routinely used on the runways, taxiways and aprons is required to travel over any portion of aircraft movement areas, it shall be escorted by a vehicle properly identified to operate in the area or be provided with a flag on a staff so attached to the vehicle so that the flag will be readily visible.

A flag or escort vehicle is not required for vehicles that have been painted, marked, and lighted for routine use on aircraft movement areas. Any vehicle operation on the movement area during the hours of darkness shall be equipped with a flashing amber dome-type beacon.

Vehicular traffic crossing active movement areas must be controlled by two-way radio in communication with the control tower and by escort or flagman. The clearance shall be confirmed by the driver's personal observation that no aircraft is approaching his position. Aircraft have the right-of-way at all times.

**Airport Construction Restrictions and Requirements:**

The Contractor is responsible for compliance at all times with the policies and guidelines specified in Chandler Municipal Airport's *Construction Safety Plan*, and with the FAA Advisory Circular (AC) 150/5370-2 (latest edition), *Operational Safety on Airports During Construction*. These documents may be made available to the Contractor upon request.

**Approved Airfield Radios:**

If needed, the Contractor shall be responsible for obtaining and maintaining ICOM IC-A24/A6 VHF Air Band Transceiver radios, or approved equal, for his crews for use during construction and will not be permitted to borrow radios from the airport for use during construction. At a minimum, the Contractor shall provide radios for the Project Superintendent, all personnel required to control construction traffic across active runways, taxiways, and parking aprons, and operators on controlled surfaces, (i.e. sweeper operators, escort vehicles, or others who have need to operate/transit outside of the restricted construction areas). All costs associated with acquiring and maintaining the approved radios shall be considered incidental to SP-60.05.1 bid item and no separate payments will be made.

**Haul Route:**

The Contractor must follow the haul route provided on the Approved Plans, or as directed by the Airport and/or Resident Project Representative (RPR). The Contractor shall keep all work areas clean of debris and shall be fully liable for any damages that occur to an aircraft caused by construction debris. The Contractor shall be responsible to restore any damages to any pavement used as haul routes incurred during construction to the original state at no additional cost to the owner. All cost associated with the restoration of the haul routes shall be considered incidental to other appropriate bid items and no separate payments will be made.

**Measurement and Payment:**

Measurement and payment for Airfield Safety and Security shall be by lump sum and shall be considered full compensation for furnishing all labor, materials, fuel, warning lights, crossing guards, escorts, furnishing, placing, and maintaining (day and night) all temporary fencing, barricades and lights, maintaining and operating Airport-supplied Lighted X's, all vehicle and equipment markings, and training for all construction personnel, tools, equipment, flagmen, cell phones, radios, and incidentals to safely control traffic as identified in these Special Provisions and in the *Construction Safety and Phasing Plan* (Appendix A) to provide the proper security for Chandler Municipal Airport.

Partial payments of the lump sum item will be made uniformly over the contract time, provided that the airfield safety and security is maintained and satisfactory to the RPR. All costs for all work, tools, equipment, materials, etc. for Airfield Safety and Security as described herein shall be provided in the bid line item provided below.

Payment will be made under:

No. 5, Spec No. SP-60.05.1

Airfield Safety and Security – per Lump Sum

**END SECTION 60**

## SECTION 70 MISCELLANEOUS

### 70.01 Project Signs

The Contractor shall furnish and erect one (1) project sign and one or more access gate sign(s). The signs shall be maintained by the Contractor for the duration of the project and shall be removed by the Contractor during final clean-up. The Owner in the Pre-Construction Conference shall determine the location of the project sign. The sign shall be furnished and erected by the Contractor prior to the start of construction. The project sign shall 4 feet by 8 feet, mounted on 4-inch by 4-inch posts buried 48 inches deep (minimum), where the sign is 3 feet above grade. The information on the sign shall be determined by the Chandler Municipal Airport, below is an example:

City of Chandler DOLLARS AT WORK CHANDLER MUNICIPAL AIRPORT  <b><i>Taxiway 'B' Improvements Phase 1</i></b> FINANCED BY ADOT and the City of Chandler Project Cost: \$_____
--

The gate signs shall be 2 sign faces back to back and facing both directions of traffic. The gate sign shall be 4 feet by 8 feet, mounted on 4-inch by 4-inch posts buried 48 inches deep (minimum), where the sign is 3 feet above grade. The information on the gate signs shall be non-reflective green background and nonreflective white letter and numbers, as follows:

CHANDLER MUNICIPAL AIRPORT GATE NO. _____
--

No direct payment will be made for furnishing and erecting the project sign and the access gate sign(s). The cost thereof shall be included in other items for which direct payment is made. The Engineer or his authorized representative shall determine the gate sign location(s).

If required by the Engineer, the Contractor shall provide and maintain public relations banners consisting of at least two (2) banners per staging area. The banners shall be approximately five (5) feet in height and twenty (20) feet in length, three (3) color vinyl reading the information above and including the "Chandler Municipal Airport" logos, or as directed by the Airport. Banners will be replaced as necessary to provide an acceptable condition. The Contractor shall not display or advertise their name or logo on the outside of the security fence or gates.

## END SECTION 70

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## **SECTION 80      CONSTRUCTION ITEMS**

### **80.01 Riprap**

#### **Description**

Riprap shall be in accordance MAG Specifications Section 703, (D50 = 6-inches at 12-Inch Depth). All riprap shall consist of rounded river rock. The riprap shall be constructed to a minimum depth as noted in the plans, at the locations shown in the plans or as directed by the RPR. The top of the riprap shall be built flush where it lies with the adjacent grade around it or as directed by the RPR. Any work found to be inconsistent with the plans, details, and the specifications will require the removal and replacement at the Contractor's sole expense. All earthwork excavation and miscellaneous removals necessary required for riprap installation as directed by the RPR shall be considered incidental to the riprap payment line item provided below.

#### **Method of Measurement**

Measurement for riprap shall be made by the square yard and shall include furnishing and installing all material complete in place, as called for on the plans and shall include all costs of removal of obstructions, excavation, compaction, and all other related work not specifically covered in other pay items.

#### **Method of Payment**

Payment for riprap shall be made at the contract unit price per square yard. This price shall include compensation in full for furnishing and installing material complete in place, as called for on the plans and shall include all costs of removal of obstructions, excavation, compaction, and all other related work not specifically covered in other pay items.

Payment will be made under:

No. 6, Spec No. SP-80.01.1	Riprap (D50 = 6-Inch, T = 12-Inch) – per Square Yard
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## **END SECTION 80**

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## DIVISION II

### CIVIL TECHNICAL SPECIFICATIONS

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## Item C-100 Contractor Quality Control Program (CQCP)

**100-1 General.** Quality is more than test results. Quality is the combination of proper materials, testing, workmanship, equipment, inspection, and documentation of the project. Establishing and maintaining a culture of quality is key to achieving a quality project. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) 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 here and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

- a. Provide qualified personnel to develop and implement the CQCP.
- b. Provide for the production of acceptable quality materials.
- c. Provide sufficient information to assure that the specification requirements can be met.
- d. Document the CQCP process.

The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and approved by the Resident Project Representative (RPR). No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and approved.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the quality assurance (QA) testing requirements. QA testing requirements are the responsibility of the RPR or Contractor as specified in the specifications.

### 100-2 Description of program.

**a. General description.** The Contractor shall establish a CQCP to perform QC inspection and testing of all items of work required by the technical specifications, including those performed by subcontractors. The CQCP shall ensure conformance to applicable specifications and plans with respect to materials, off-site fabrication, workmanship, construction, finish, and functional performance. The CQCP 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 QC.

**b. Contractor Quality Control Program (CQCP).** The Contractor shall describe the CQCP in a written document that shall be reviewed and approved by the RPR prior to the start of any production, construction, or off-site fabrication. The written CQCP shall be submitted to the RPR for review and approval at least 10 calendar days before the CQCP Workshop. The Contractor's CQCP and QC testing laboratory must be approved in writing by the RPR prior to the Notice to Proceed (NTP).

The CQCP shall be organized to address, as a minimum, the following:

1. QC organization and resumes of key staff
2. Project progress schedule
3. Submittals schedule
4. Inspection requirements
5. QC testing plan
6. Documentation of QC activities and distribution of QC reports
7. Requirements for corrective action when QC and/or QA acceptance criteria are not met
8. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor must add any additional elements to the CQCP that is necessary to adequately control all production and/or construction processes required by this contract.

### **100-3 CQCP organization.**

**a. QC technicians.** A sufficient number of QC technicians necessary to adequately implement the CQCP must be provided. These personnel must be either Engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of two (2) years of experience in their area of expertise.

The QC technicians must report directly to a responsible project supervisor 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 100-6.
2. Performance of all QC tests as required by the technical specifications and paragraph 100-8.
3. Performance of tests for the RPR when required by the technical specifications.

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

**b. Staffing levels.** The Contractor shall provide sufficient qualified QC 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 CQCP shall state where different technicians will be required for different work elements.

**100-4 Project progress schedule.** Critical QC activities must be shown on the project schedule as required by Section 80, paragraph 80-03, *Execution and Progress*.

**100-5 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 as a minimum:

- a. Specification item number
- b. Item description
- c. Description of submittal
- d. Specification paragraph requiring submittal
- e. Scheduled date of submittal

**100-6 Inspection requirements.** QC 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 100-9.

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

a. During plant operation for material production, QC 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 CQCP shall detail how these and other QC functions will be accomplished and used.

b. During field operations, QC 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 CQCP shall document how these and other QC functions will be accomplished and used.

**100-7 Contractor QC testing facility.**

a. For projects that include Item P-401, Item P-403, and Item P-404, the Contractor shall ensure facilities, including all necessary equipment, materials, and current reference standards, are provided that meet requirements in the following paragraphs of ASTM D3666, *Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials*:

- 8.1.3 Equipment Calibration and Checks;
- 8.1.9 Equipment Calibration, Standardization, and Check Records;
- 8.1.12 Test Methods and Procedures

**100-8 QC testing plan.** As a part of the overall CQCP, the Contractor shall implement a QC 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 QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

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

- a. Specification item number (e.g., P-401)
- b. Item description (e.g., Hot Mix Asphalt Pavements)
- c. Test type (e.g., gradation, grade, asphalt content)
- d. Test standard (e.g., ASTM or American Association of State Highway and Transportation Officials (AASHTO) test number, as applicable)
- e. Test frequency (e.g., as required by technical specifications or minimum frequency when requirements are not stated)
- f. Responsibility (e.g., plant technician)
- g. Control requirements (e.g., target, permissible deviations)

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples in accordance with ASTM D3665. The RPR shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-9.

**100-9 Documentation.** The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC 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 RPR daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by a responsible project supervisor.

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

**a. Daily inspection reports.** Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations. These technician's daily reports shall provide factual evidence that continuous QC 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. Summary of any necessary corrective actions
7. Safety inspection.
8. Photographs and/or video

The daily inspection reports shall identify all QC inspections and QC tests 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 QC technician and a responsible project supervisor. The RPR shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results must be archived.

**b. Daily test reports.** The Contractor shall be responsible for establishing a system that will record all QC 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 RPR prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically, the results must be archived.

**100-10 Corrective action requirements.** The CQCP 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 CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear 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 QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

**100-11 Inspection and/or observations by the RPR.** All items of material and equipment are subject to inspection and/or observation by the RPR at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed here and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to inspection and/or observation by the RPR at the site for the same purpose.

Inspection and/or observations by the RPR does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

#### **100-12 Noncompliance.**

**a.** The Resident Project Representative (RPR) will provide written notice to the Contractor of any noncompliance with their CQCP. After receipt of such notice, the Contractor must take corrective action.

**b.** When QC activities do not comply with either the CQCP or the contract provisions or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the RPR will recommend the Owner take the following actions:

- 1.** Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors and/or
- 2.** Order the Contractor to stop operations until appropriate corrective actions are taken.

### **METHOD OF MEASUREMENT**

**100-13 Basis of measurement and payment.** Contractor Quality Control Program (CQCP) is for the personnel, tests, facilities, and documentation required to implement the CQCP. The CQCP will be paid as a lump sum with the following schedule of partial payments:

- a.** With first pay request, 25% with approval of CQCP.
- b.** When 25% or more of the original contract is earned, an additional 25%.
- c.** When 50% or more of the original contract is earned, an additional 20%.
- d.** When 75% or more of the original contract is earned, an additional 20%
- e.** After final inspection and acceptance of project, the final 10%.

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## **BASIS OF PAYMENT**

### **100-14 Payment will be made under:**

No. 1, Spec No. C-100-14.1 Contractor Quality Control Program (CQCP) – per Lump Sum

## **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

National Institute for Certification in Engineering Technologies (NICET)

ASTM International (ASTM)

ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

## **END OF ITEM C-100**



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## **Item C-102 Temporary Air and Water Pollution, Soil Erosion, and Siltation Control**

### **DESCRIPTION**

**102-1.1** This item shall consist of temporary control measures as shown on the plans or as ordered by the Resident Project Representative (RPR) during the life of a contract to control pollution of air and water, soil erosion, and siltation through the use of silt fences, berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

Temporary erosion control shall be in accordance with the approved erosion control plan; the approved Construction Safety and Phasing Plan (CSPP) and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Temporary control measures shall be designed, installed and maintained to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near public-use airports.

**102-1.2** This project is subject to the terms and conditions of Arizona Pollutant Discharge Elimination System (AZPDES) General Permit No. AZG2020-001 for Storm Water Discharges Associated with Construction Activities (*2020 CGP*). Under the provisions of the *2020 CGP*, both the County and the Contractor shall be designated as operators, and both must ensure compliance with the terms and conditions contained therein.

Work under this item shall consist of preparing all required documents and certifications, performing inspections, and furnishing all materials, labor, and equipment necessary to comply with all requirements of *2020 CGP*.

### **MATERIALS**

**102-2.1 Grass.** Grass that will not compete with the grasses sown later for permanent cover per Item T-901 shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover. Selected grass species shall not create a wildlife attractant.

**102-2.2 Mulches.** Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials. Mulches shall not create a wildlife attractant.

**102-2.3 Fertilizer.** Fertilizer shall be a standard commercial grade and shall conform to all federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

**102-2.4 Slope drains.** Slope drains may be constructed of pipe, fiber mats, rubble, concrete, asphalt, or other materials that will adequately control erosion.

**102-2.5 Silt fence.** Silt fence shall consist of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life. Silt fence shall meet the requirements of ASTM D6461.

**102-2.6 Other.** All other materials shall meet commercial grade standards and shall be approved by the RPR before being incorporated into the project.

## CONSTRUCTION REQUIREMENTS

**102-3.1 General.** In the event of conflict between these requirements and pollution control laws, rules, or regulations of other federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The RPR shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

**102-3.2 Schedule.** Prior to the start of construction, the Contractor shall submit schedules in accordance with the approved Construction Safety and Phasing Plan (CSPP) and the plans for accomplishment of temporary and permanent erosion control work for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the RPR.

**102-3.3 Construction details.** The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the plans and approved CSPP. Except where future construction operations will damage slopes, the Contractor shall perform the permanent seeding and mulching and other specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

Where erosion may be a problem, schedule and perform clearing and grubbing operations so that grading operations and permanent erosion control features can follow immediately if project conditions permit. Temporary erosion control measures are required if permanent measures cannot immediately follow grading operations. The RPR shall limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current with the accepted schedule. If seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified as directed by the RPR.

The Contractor shall provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment as directed by the RPR. If temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or directed by the RPR, the work shall be performed by the Contractor and the cost shall be incidental to this item.

The RPR may increase or decrease the area of erodible earth material that can be exposed at any time based on an analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor during the construction period.

Provide temporary structures whenever construction equipment must cross watercourses at frequent intervals. Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into any waterways, impoundments or into natural or manmade channels.

**102-3.4 Installation, maintenance and removal of silt fence.** Silt fences shall extend a minimum of 16 inches and a maximum of 34 inches above the ground surface. Posts shall be set no more than 10 feet on center. Filter fabric shall be cut from a continuous roll to the length required minimizing joints where possible. When joints are necessary, the fabric shall be spliced at a support post with a minimum 12-inch overlap and securely sealed. A trench shall be excavated approximately 4 inches deep by 4 inches wide on the upslope side of the silt fence. The trench shall be backfilled and the soil compacted over the silt fence fabric. The Contractor shall remove and dispose of silt that accumulates during construction and prior to establishment of permanent erosion control. The fence shall be maintained in good working condition until permanent erosion control is established. Silt fence shall be removed upon approval of the RPR.

## PERMIT REQUIREMENTS

**102-4.1** Please note that the terms and conditions of Arizona Pollutant Discharge Elimination System (AZPDES) General Permit No. AZG2020-001 for Storm Water Discharges Associated with Construction Activities (*2020 CGP*), except to the extent that more explicit or more stringent requirements are written directly into the contract documents, have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

Both the Airport and the Contractor are designated as operators of the construction site. Both must complete a joint Notice of Intent (NOI) with both the Airport and the Contractor listed on the NOI and the Storm Water Pollution Prevention Plan (SWPPP) to comply with the terms and conditions of the *2020 CGP*.

The NOI's must be signed by the contractor in accordance with the signatory requirements of the *2020 CGP* and must contain all required eligibility certifications. The Project Manager for the Airport will ensure that both the Contractor's and the Airport's completed and signed NOI's are submitted to the ADEQ.

It shall be the responsibility of the Contractor to prepare a joint SWPPP and both the Airport and the Contractor must ensure its compliance with the minimum conditions of the *2020 CGP*, including measures to protect impaired or unique waters, measures to protect threatened and/or endangered species, and measures to protect properties eligible for protection under the National Historic Preservation Act. The SWPPP must reflect the Contractor's entire scope of activities at the job site as anticipated for the duration of the construction activities. The Contractor must indicate in the SWPPP those changes in job site requirements and for the order of work performance that will require modifications to the SWPPP and include those modifications in the SWPPP.

Once completed, it shall be the responsibility of the Airport to review and approve the SWPPP prior to the start of work. The preconstruction conference shall not be held and the Contractor shall not be allowed to start work until the Airport has approved the SWPPP as being adequate and in accordance with the requirements of the *2020 CGP*. The Airport shall approve or not approve the SWPPP within seven (7) calendar days after receipt of the SWPPP from the Contractor for purposes of review. Failure of the Contractor and the Airport to reach agreement on the adequacy of the SWPPP prior to the preconstruction conference will delay the start of work. The Contractor shall not be entitled to additional compensation for costs that result from such delay in the construction start date.

The SWPPP is not to be submitted to the ADEQ unless directed to do so by the Airport or in response to a direct request from the ADEQ Director (or authorized representative). If the SWPPP must be submitted to the ADEQ for review and approval, authorization to discharge under the *2020 CGP* may be withheld by ADEQ for up to thirty-two (32) business days after receipt of the SWPPP.

It shall be the responsibility of the Contractor to implement the SWPPP, and ensure day-to-day compliance with the terms and conditions of the SWPPP and the *2020 CGP*. The Contractor shall, with the approval of the Airport Project Coordinator, update and revise the SWPPP as necessary throughout the duration of the project to ensure compliance with the *2020 CGP* requirements.

The Contractor shall retain a copy of the SWPPP and the *2020 CGP* at a central location on the job site for the use of all operators whenever they are on the construction site. A copy of the signed SWPPP must be retained on the construction site or at another location easily accessible during normal working hours.

All subcontractors and construction site operators having control over only a portion of the construction site shall comply with the requirements of the *2020 CGP* and the common SWPPP under the supervision of the Contractor. The Contractor shall ensure that all partial site operators having day-to-day operational control of activities necessary to ensure compliance with the SWPPP or other permit requirements submit NOIs to ADEQ as required by the *2020 CGP*. Subcontractors and partial site operators shall ensure that their activities do not render any other party's pollution prevention plan measures ineffective.

The Contractor shall obtain and incorporate into the SWPPP copies of all NOIs required by the *2020 CGP*. The Contractor shall ensure that all required documents are complete and accurate, and all required NOIs are received by ADEQ at least two (2) business days before a contractor, subcontractor, or partial site operator is allowed to perform any work at the construction site.

The Contractor shall submit the Contractor's completed and signed NOI form to the ADEQ through the *myDEQ* through the ADEQ website ([www.azdeq.gov](http://www.azdeq.gov)).

The Contractor shall provide a copy of the Contractor's completed and signed NOI form to the Airport at the preconstruction conference. The Contractor shall ensure that a copy of the Contractor's completed NOI form along with a copy of the Airport's completed NOI form is incorporated into the SWPPP. The Contractor must submit the NOI to the City if so directed by the Airport.

Failure by the Contractor to provide copies of the required completed NOI forms by the time of the preconstruction conference shall cause a delay in the construction start date. The Contractor shall not be entitled to additional compensation for costs that result from such delay in the construction start date.

The Contractor must submit an amended NOI if ADEQ provides notification that the previously submitted NOI is incomplete. The amended NOI must be submitted to the ADEQ, the Airport, and if so directed by the Airport, to the City.

The Contractor may assume coverage under the *2020 CGP* two (2) business days after receipt of the NOI by ADEQ; unless ADEQ provides notification that the NOI needs additional evaluation. Such notification may be made in writing, electronically, by fax, or by phone; and will typically be made within two (2) business days after receipt of the NOI. The Contractor cannot assume coverage under the permit and must delay the start of construction for a period of thirty-two (32) business days after receipt of the NOI by ADEQ, unless additional notice is received from ADEQ during this time period. If there is no additional notice, the Contractor may assume coverage under the *2020 CGP* and initiate construction activities at the end of the 32 business days.

**102-4.2** The SWPPP must be prepared prior to submitting the NOI to ADEQ for coverage under the *2020 CGP*, and the Contractor must implement the SWPPP as written from the initial commencement of construction activity until final stabilization is complete. A Draft SWPPP Plan Template is included in the project plans for use by the Contractor in preparing the final SWPPP. The SWPPP must be prepared in accordance with good engineering practice, and must:

- a. Identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site;
- b. Identify, describe and ensure implementation of Best Management Practices (BMPs) that will be used to reduce the amount of pollutants in storm water discharges from the construction site;
- c. Assure compliance with the terms and conditions of the *2020 CGP*; and
- d. Identify the party responsible for on-site implementation of the SWPPP.

Specific requirements for the contents of the SWPPP include identification of all operators of the project site, and the areas over which each operator has control. The SWPPP must also provide a description of the nature of the construction activity that includes:

- a. A description of the project and its intended use after the Notice of Termination (NOT) is filed (e.g. a municipal park, a municipal building, high density housing, a city street, a water treatment plant, a municipal airport, etc.);
- b. A description of the intended sequence of activities that disturb the soil at the site (e.g. grubbing, excavation, grading, utilities, infrastructure installation, etc.);
- c. The total area of the site, and an estimate of the total area of the site expected to be disturbed by excavation, grading, or other activities, including off-site borrow and fill areas;

- d.** An estimate of the runoff coefficient of the site for both the pre-construction and postconstruction conditions, and data describing the soil and any existent data on the quality of any discharge from the site;
- e.** A general location map (e.g. USGS quadrangle map, a portion of a city or county map, or other map) with enough detail to identify the location of the construction site and the receiving waters within one mile of the site.

The SWPPP must contain a legible site map completed to scale that shows the entire site, and identifies:

- a.** The directions of storm water flow (e.g. use arrows to show which way or ways storm water will flow on, through, and off the site), and the approximate slopes anticipated after major grading activities;
- b.** Areas of soil disturbance and areas of no soil disturbance;
- c.** Locations of structural and non-structural controls identified in the SWPPP;
- d.** Locations where stabilization practices are expected to occur;
- e.** Locations of off-site material, waste, borrow areas, or equipment storage areas;
- f.** Locations of all surface water bodies (including wetlands);
- g.** Locations where storm water discharges to surface water (including dry washes) and to the City's storm sewer system;
- h.** Locations and registration numbers of on-site drywells;
- i.** Areas where final stabilization has been accomplished and no further construction-phase permit requirements apply.

The SWPPP must identify the nearest receiving water or waters, including ephemeral and intermittent streams, dry sloughs, and arroyos. If applicable, the SWPPP must also identify the area and extent of, and describe any wetlands near the site that could be disturbed or that could potentially receive discharges from the disturbed areas of the project.

The SWPPP must identify the location and describe any storm water or non-storm water discharges at the site associated with activity other than construction and other pollutant sources, such as fueling operations, on-site material storage areas, waste piles, etc. This includes discharges from dedicated asphalt plants and dedicated concrete plants that are covered by the *2020 CGP*.

The SWPPP must identify and address off-site storage areas or borrow areas that are used solely for this construction project.

The SWPPP must describe all pollution control measures that will be implemented as part of the construction project to control pollutants in storm water discharges. For each major activity identified in the project description, the SWPPP must clearly describe appropriate control measures; the general sequence during the construction process when the measures will be implemented; and identify the construction site operator responsible for the implementation of the described control measures.



Off-site material storage areas (including overburden and stockpiles of dirt, borrow areas, etc.) used solely by the Contractor for the permitted construction project are considered a part of the project and must be addressed in the SWPPP.

For purposes of controlling erosion and sediment, the SWPPP must address the following:

- a.** Erosion and sediment controls must be designed to retain sediment on the construction site to the extent practicable.
- b.** All control measures must be properly selected, installed, and maintained per the manufacturer's specifications and good engineering practices. If periodic inspections or information is discovered that indicates a control has been used inappropriately, or installed incorrectly, the Contractor must replace or modify the control for site situations as soon as practicable and before the next anticipated storm event.
- c.** When sediment escapes the construction site, off-site accumulations of sediment must be routinely removed at a frequency sufficient to ensure no adverse effects on water quality.

The SWPPP must describe good housekeeping procedures to prevent litter, construction debris, and construction chemicals exposed to storm water from becoming a pollutant source for storm water discharges.

The SWPPP must include a description of and identify interim and permanent stabilization practices for the construction site, including a schedule of when the practices will be implemented. The SWPPP shall document those areas where existing vegetation will be preserved.

The Contractor must initiate stabilization measures within 14 calendar days in those areas where construction activities have temporarily or permanently ceased, except:

- a.** Where stabilization by the 14th day is precluded by frozen ground conditions, stabilization measures must be initiated as soon as practicable.
- b.** Where construction activity on a portion of the site has temporarily ceased, but earth disturbing activities will resume in that area within the 14 days. In this event, temporary stabilization measures do not have to be initiated on that portion of the site.
- c.** When the site is using vegetative stabilization measures and it is during seasonally arid conditions, vegetative stabilization measures must be initiated as soon as practicable.

The Contractor must maintain the following records as part of the SWPPP:

- a.** Dates when major grading activities occur;
- b.** Dates when construction activities temporarily or permanently cease on a portion of the site;
- c.** Dates when stabilization measures are initiated and completed, and the reasons for any delay.



The SWPPP must describe structural practices to divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Placement of structural practices in floodplains should be avoided to the degree attainable. A combination of sediment and erosion control measures is required to achieve maximum pollutant removal. Sediment basins and velocity dissipation devices must be utilized and placed in accordance with Part IV.D.5 of the *2020 CGP*.

The SWPPP must include a description of post-construction storm water management measures that will be installed during the construction process to control pollutants in storm water discharges after construction operations have been completed. Structural measures shall be placed on upland soils to the degree attainable and must be designed and installed consistent with applicable Airport or City storm water management requirements.

The SWPPP must identify all allowable sources of non-storm water discharges listed in Part I.C.2 of the *2020 CGP* except for flows from firefighting activities. Non-storm water discharges are to be eliminated or reduced to the extent feasible. The Contractor must implement appropriate BMPs to minimize pollutants in any non-storm water discharges and must describe those BMPs in the SWPPP. Except if used in emergency firefighting, super-chlorinated wastewaters must be held on-site until the chlorine dissipates, or otherwise dechlorinated prior to discharge.

The SWPPP must describe:

- a.** Measures to prevent the discharge of solid materials, including building materials, to waters of the United States, except as authorized by a permit issued under section 404 of the Clean Water Act;
- b.** Measures to minimize off-site vehicle tracking of sediments, to the extent practicable, and the generation of on-site dust;
- c.** Construction and waste materials expected to be stored on-site with updates as appropriate. The SWPPP must also include a description of the controls to reduce pollutants from these materials including storage practices to minimize exposure of the materials to storm water, and spill prevention and response practices;
- d.** Any pollutant sources from areas other than construction (including storm water discharges from dedicated asphalt plants, dedicated concrete plants, and/or any other nonconstruction pollutant sources), with details of controls and measures that will be implemented at those sites to minimize pollutant discharges; and
- e.** Measures to sufficiently stabilize soil at culvert locations to prevent the formation of rills and gullies during construction.

The SWPPP must include a copy of the *2020 CGP*. Copies of the NOIs submitted to ADEQ and/or copies of the certificates received from ADEQ specifying the authorization numbers must also be incorporated into the SWPPP as they become available. If any other agreements with state, federal, or local officials exist that would affect the provisions or implementation of the SWPPP, copies of these agreements must also be included in the SWPPP. (Please note: these types of agreements would include grading and drainage approvals and/or permits, and storm water management approvals and/or permits issued by the City.)

The SWPPP must be consistent with applicable federal, state, and local requirements for soil and erosion control or storm water management. The SWPPP may incorporate by reference the appropriate elements of soil and erosion or storm water management plans required by other agencies. A copy of these requirements incorporated by reference must be provided as an attachment to the SWPPP and must be updated as necessary to remain consistent with any revisions made to the requirements by the responsible agency or agencies.

A schedule for routine inspections of the construction site must be included in the SWPPP. This schedule must comply with Part IV.H.1 and Part IV.H.2 of the *2020 CGP*.

The Contractor must sign the SWPPP in accordance with Part VII.K of the *2020 CGP*. A copy of the signed SWPPP must be retained on the construction site or at another location easily accessible during normal working hours.

**102-4.3** The Contractor shall not begin any construction activity until all applicable SWPPP controls, devices, and practices have been put into place.

In accordance with the terms and conditions of the *2020 CGP*, the Contractor shall post the following documents at the construction site near the main entrance:

- a. The AZPDES authorization number for the project or a copy of the NOI if an authorization number has not yet been assigned,
- b. The name and telephone number of a local office or site contact person,
- c. A brief description of the construction project, and
- d. The location of the SWPPP if the site is inactive or does not have an on-site location to store the plan, and the name of the contact person for accessing the SWPPP.

The Contractor shall provide adequate and timely maintenance of vegetation, erosion and sediment control measures, and other protective measures and/or BMPs identified in the site plan or SWPPP to ensure that they remain in effective operating condition. Maintenance needs identified through inspections or other means shall be accomplished as soon as practicable and before the next anticipated storm event. If existing protective measures need to be modified or additional measures added, implementation of these changes must be completed before the next anticipated storm event, if practicable. If not practicable, implementation must be completed as soon as it is practicable. Sediment and debris must be removed from sediment traps, sediment ponds, trash racks, and similar structures when the design capacity of the structure has been reduced by fifty (50) percent.

The Contractor shall employ qualified personnel as defined by Part IV.H.3 of the *2020 CGP* to inspect construction site areas in accordance with the requirements of Part IV.H.4 of the *2020 CGP*. All inspection results shall be documented in reports that, at a minimum, include:

- a. The inspection date;
- b. The name, title, and qualifications of the person or persons performing the inspection. The qualifications must be either on or attached to the report. Alternatively, if the SWPPP documents the qualifications of the person or persons performing the inspection, then that portion of the SWPPP may be referenced;

- c.** The weather information for the period since the last inspection (or since the start of construction if this is the first inspection), including the best estimate of the beginning of each storm event, the duration of each event, the time that has elapsed since the last storm event, and the approximate amount of rainfall for each event in inches;
- d.** The location or locations of discharges of sediment or other pollutants from the site; Airport;
- e.** The location or locations and identification of BMP's that need to be maintained, failed to operate as designed, or proved inadequate;
- f.** The location or locations where additional BMP's that do not exist at the time of the inspection need to be implemented;
- g.** Any corrective actions required, including any changes to the SWPPP that are needed, and the dates for implementation;
- h.** Identification of all sources of non-storm water and their associated pollution prevention control measures; and
- i.** Identification of material storage areas, and any evidence of or potential for pollutant discharge from such areas.

The Contractor must retain the inspection reports and any records of follow-up actions taken for a period of at least three (3) years from the date permit coverage expires or is terminated. Inspection reports must identify any instance of non-compliance with the terms and conditions of the *2020 CGP*. Where no instance of non-compliance is identified, the report must contain a certification that the construction project or site is being operated in compliance with the SWPPP and the *2020 CGP*. The report shall be signed in accordance with Part VII.K of the permit. Copies of all inspection reports shall be provided to the Airport at least once each month throughout the duration of the project.

Based on the results of the inspection, the Contractor must modify the SWPPP to include additional or modified BMPs designed to correct problems identified. These revisions must be completed within seven (7) calendar days following the inspection. If existing BMPs need to be modified, or if additional BMPs are needed, implementation must be completed before the next anticipated storm event. If implementation before the next anticipated storm event is not practicable, implementation must occur as soon as it is practicable.

The Contractor, with the approval of the Airport, must amend the SWPPP within fifteen (15) business days whenever:

- 1.** There is a change in design, construction, operation, or maintenance at the construction site that has a significant effect on the discharge of pollutants to the waters of the United States, and such effect has not been previously addressed in the SWPPP; or
- 2.** Inspections, monitoring (if required), or investigations by the Contractor, the City, state officials, or federal officials determine the discharges are causing or contributing to water quality exceedances, or the SWPPP is ineffective in eliminating or significantly minimizing pollutants in storm water discharges from the construction site.

The SWPPP and all reports required under this contract shall be available to the public in accordance with the requirements of section 308b. of the Clean Water Act. The Contractor shall make plans and reports available upon request to the ADEQ Director (or authorized representative); State, Tribal, or local agency with approval authority for sediment and erosion control plans, grading plans, or storm water management plans; local government officials; or to the operator of a municipal separate storm sewer receiving discharges from the site in accordance with the terms and conditions of the *2020 CGP*.

The ADEQ Director (or authorized representative) may notify the Contractor and/or the Airport at any time that the SWPPP is inadequate or does not meet one or more of the requirements of Part IV of the *2020 CGP*. Within fifteen (15) business days of receipt of such notification from ADEQ (or as otherwise provided by ADEQ), the Contractor must make the required changes to the SWPPP and submit to the ADEQ a written certification that the requested changes were made and implemented. The ADEQ may request submittal or re-submittal of the SWPPP to verify that all deficiencies have been adequately addressed.

No condition of the *2020 CGP* or the SWPPP shall release the Contractor from any responsibilities or requirements under any other environmental statutes or regulations, including requirements for the prevention or minimization of the discharge of hazardous substances or oil. If there is a release containing a hazardous substance or oil in an amount equal to or greater than the reportable quantities established under federal regulations that has the potential to impact storm water discharges from this site, the Contractor must report the release to the regulatory agencies in accordance with regulatory requirements. In addition, the Contractor must modify the SWPPP within fourteen (14) calendar days after gaining knowledge of the release to provide a description of the release, the circumstances leading to the release, and the date of the release. The SWPPP must identify measures to minimize and/or prevent the occurrence of such releases, and appropriate measures for responding to such releases. The *2020 CGP* does not authorize the discharge of any substance resulting from on-site spills, or the discharge of oil or chemicals.

The SWPPP (including a copy of the *2020 CGP*) shall be kept on the project site from the date of commencement of construction activities to the date of submittal of the Notice of Termination (NOT). A copy of the SWPPP and the permit shall be retained by the Contractor for a period of at least three (3) years following the date of final stabilization of the construction site. The Contractor shall also retain for the same three-year period all reports required by the *2020 CGP* and all records of data used to complete the NOI.

It shall be the responsibility of the Contractor to ensure that copies of all documents and records retained by the Contractor in accordance with requirements of the AZPDES permit are also provided to the Airport.

Within thirty (30) days of the date of final stabilization of the construction site, the Contractor shall submit a completed and properly signed Notice of Termination (NOT) form to the Airport. The Airport will also complete a NOT form, and will submit both the Contractor's and the Airport's NOT to the ADEQ at the address specified on the NOT form; thereby terminating the Contractor's and the Airport's *2020 CGP* coverage for the project.

## METHOD OF MEASUREMENT

**102-5.1** Storm Water Pollution Prevention Plan (SWPPP) is for the Contractor's participation in the preparation of the SWPPP, the implementation of the SWPPP, and the modification of the SWPPP as necessary for compliance with the *2020 CGP*.

The SWPP will be paid as a lump sum on a monthly schedule of equal payments throughout the entire construction period including any retention required by the terms and conditions of the construction contract to be paid after filing of the Notice of Termination (NOT).

No separate measurement or direct payment will be made for preparing the Notice of Intent (NOI), the Notice of Termination (NOT), Inspection and Maintenance Reports, or other documentation required to perform the work, the cost being considered as included in the allowance.

**102-5.2** Temporary erosion and pollution control work required will be performed as scheduled or directed by the RPR. Completed and accepted work will not be measured and paid for directly but shall be considered as incidental to the implementation of the SWPPP.

- a. Temporary seeding and mulching.
- b. Temporary slope drains.
- c. Temporary benches, dikes, dams, and sediment basins, including necessary cleaning of sediment basins, and embankment placed as directed by the RPR.
- d. Fertilizing.
- e. Installation and removal of silt fence.

**102-5.3** Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor.

## BASIS OF PAYMENT

**102-6.1** Payment will be made under:

No. 2, Spec No. C-102-6.1 Storm Water Pollution Prevention Plan (SWPPP) – per Lump Sum

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## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### Advisory Circulars (AC)

AC 150/5200-33     Hazardous Wildlife Attractants on or Near Airports

AC 150/5370-2     Operational Safety on Airports During Construction

### ASTM International (ASTM)

ASTM D6461     Standard Specification for Silt Fence Materials

### United States Department of Agriculture (USDA)

FAA/USDA Wildlife Hazard Management at Airports, A Manual for Airport Personnel

## END OF ITEM C-102

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## Item C-105 Mobilization

**105-1 Description.** This item of work shall consist of, but is not limited to, work and operations necessary for the movement of personnel, equipment, material and supplies to and from the project site for work on the project except as provided in the contract as separate pay items.

**105-2 Mobilization limit.** Mobilization shall be limited to 8 percent of the total project cost. Any amount bid over 8 percent will be paid after Final Completion of the project.

**105-3 Posted notices.** Prior to commencement of construction activities, the Contractor must post the following document in a prominent and accessible place where it may be easily viewed by all employees of the prime Contractor and by all employees of subcontractors engaged by the prime Contractor: Equal Employment Opportunity (EEO) Poster "Equal Employment Opportunity is the Law" in accordance with the Office of Federal Contract Compliance Programs Executive Order 11246. This notice must remain posted until final acceptance of the work by the Owner.

**105-4 Engineer/RPR field office.** An Engineer/RPR field office is not required.

## METHOD OF MEASUREMENT

**105-5 Basis of measurement and payment.** Based upon the contract lump sum price for "Mobilization" partial payments will be allowed as follows:

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

## BASIS OF PAYMENT

**105-6 Payment will be made under:**

No. 3, Spec No. C-105-6.1 Mobilization – per Lump Sum



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## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Office of Federal Contract Compliance Programs (OFCCP)

Executive Order 11246, as amended

EEOC-P/E-1      Equal Employment Opportunity is the Law Poster

United States Department of Labor, Wage and Hour Division (WHD)

WH 1321      Employee Rights under the Davis-Bacon Act Poster

**END OF ITEM C-105**

## Item P-101 Preparation/Removal of Existing Pavements

### DESCRIPTION

**101-1** This item shall consist of preparation of existing pavement surfaces for overlay, surface treatments, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable plans.

### EQUIPMENT AND MATERIALS

**101-2** All equipment and materials shall be specified here and in the following paragraphs or approved by the Resident Project Representative (RPR). The equipment shall not cause damage to the pavement to remain in place.

### CONSTRUCTION

#### **101-3.1 Removal of existing pavement.**

The Contractor's removal operation shall be controlled to not damage adjacent pavement structure, and base material, cables, utility ducts, pipelines, or drainage structures which are to remain under the pavement.

**a. Concrete pavement removal.** Full depth saw cuts shall be made perpendicular to the slab surface. The Contractor shall saw through the full depth of the slab including any dowels at the joint, removing the pavement and installing new dowels as shown on the plans and per the specifications. Where the perimeter of the removal limits is not located on the joint and there are no dowels present, the perimeter shall be saw cut the full depth of the pavement. The pavement inside the saw cut shall be removed by methods which will not cause distress in the pavement which is to remain in place. If the material is to be wasted on the airport site, it shall be reduced to a maximum size of 2 inches. Concrete slabs that are damaged by under breaking shall be repaired or removed and replaced as directed by the RPR.

The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Spall and underbreak repair shall be in accordance with the plans. Any underlying material that is to remain in place, shall be recompacted and/or replaced as shown on the plans. Adjacent areas damaged during repair shall be repaired or replaced at the Contractor's expense.

**b. Asphalt pavement removal.** Asphalt pavement to be removed shall be cut to the full depth of the asphalt pavement around the perimeter of the area to be removed. If the material is to be incorporated into embankment, it shall be broken to a maximum size of 2 inches.

**c. Repair or removal of Base, Subbase, and/or Subgrade.** All failed material including surface, base course, subbase course, and subgrade shall be removed and repaired as shown on the plans or as directed by the RPR. Materials and methods of construction shall comply with the applicable sections of these specifications. Any damage caused by Contractor's removal process shall be repaired at the Contractor's expense.

**101-3.2 Preparation of joints and cracks prior to overlay/surface treatment.** Remove all vegetation and debris from cracks to a minimum depth of 1 inch. If extensive vegetation exists, treat the specific area with a concentrated solution of a water-based herbicide approved by the RPR. Fill all cracks greater than 1/4 inch wide with a crack sealant per ASTM D6690. The crack sealant, preparation, and application shall be compatible with the surface treatment/overlay to be used. To minimize contamination of the asphalt with the crack sealant, underfill the crack sealant a minimum of 1/8 inch, not to exceed 1/4 inch. Any excess joint or crack sealer shall be removed from the pavement surface.

**101-3.3 Removal of Foreign Substances/contaminates prior to remarking.** Removal of foreign substances/contaminates from existing pavement that will affect the bond of the new treatment shall consist of removal of rubber, fuel spills, oil, crack sealer, at least 90% of paint, and other foreign substances from the surface of the pavement. Areas that require removal are designated on the plans and as directed by the RPR in the field during construction.

Chemicals, high-pressure water, heater scarifier (asphaltic concrete only), cold milling or sandblasting may be used. If chemicals are used, they shall comply with the state's environmental protection regulations. Removal methods used shall not cause major damage to the pavement, or to any structure or utility within or adjacent to the work area. Major damage is defined as changing the properties of the pavement, removal of asphalt causing the aggregate to ravel, or removing pavement over 1/8 inch deep. If it is deemed by the RPR that damage to the existing pavement is caused by operational error, such as permitting the application method to dwell in one location for too long, the Contractor shall repair the damaged area without compensation and as directed by the RPR.

Removal of foreign substances shall not proceed until approved by the RPR. Water used for high-pressure water equipment shall be provided by the Contractor at the Contractor's expense. No material shall be deposited on the pavement shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans.

**101-3.4 Concrete spall or failed asphaltic concrete pavement repair.**

**a. Repair of concrete spalls in areas to be overlaid with asphalt.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The perimeter of the repair shall be saw cut a minimum of 2 inches outside the affected area and 2 inches deep. The deteriorated material shall be removed to a depth where the existing material is firm or cannot be easily removed with a geologist pick. The removed area shall be filled with asphalt mixture with aggregate sized appropriately for the depth of the patch. The material shall be compacted with equipment approved by the RPR until the material is dense and no movement or marks are visible. The material shall not be placed in lifts over 4 inches in depth. This method of repair applies only to pavement to be overlaid.

**b. Asphalt pavement repair.** The Contractor shall repair all spalled concrete as shown on the plans or as directed by the RPR. The failed areas shall be removed as specified in paragraph 101-3.1b. All failed material including surface, base course, subbase course, and subgrade shall be removed. Materials and methods of construction shall comply with the applicable sections of these specifications.

**101-3.5 Cold milling.** Milling shall be performed with a power-operated milling machine or grinder, capable of producing a uniform finished surface. The milling machine or grinder shall operate without tearing or gouging the underlying surface. The milling machine or grinder shall be equipped with grade and slope controls, and a positive means of dust control. All millings shall be removed and disposed in areas designated on the plans. If the Contractor mills or grinds deeper or wider than the plans specify, the Contractor shall replace the material removed with new material at the Contractor's Expense.

**a. Patching.** The milling machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the remaining pavement and it shall have a positive method of controlling the depth of cut. The RPR shall layout the area to be milled with a straightedge in increments of 1-foot widths. The area to be milled shall cover only the failed area. Any excessive area that is milled because the Contractor doesn't have the appropriate milling machine, or areas that are damaged because of his negligence, shall be repaired by the Contractor at the Contractor's Expense.

**b. Profiling, grade correction, or surface correction.** The milling machine shall have a minimum width of 7 feet and it shall be equipped with electronic grade control devices that will cut the surface to the grade specified. The tolerances shall be maintained within +0 inch and -1/4 inch the specified grade. The machine must cut vertical edges and have a positive method of dust control. The machine must have the ability to remove the millings or cuttings from the pavement and load them into a truck. All millings shall be removed and disposed of in areas designated on the plans.

**c. Clean-up.** The Contractor shall sweep the milled surface daily and immediately after the milling until all residual materials are removed from the pavement surface. Prior to paving, the Contractor shall wet down the milled pavement and thoroughly sweep and/or blow the surface to remove loose residual material. Waste materials shall be collected and removed from the pavement surface and adjacent areas by sweeping or vacuuming. Waste materials shall be removed and disposed in areas designated on the plans.

**101-3.6. Preparation of asphalt pavement surfaces prior to surface treatment.** Existing asphalt pavements to be treated with a surface treatment shall be prepared as follows:

- a.** Patch asphalt pavement surfaces that have been softened by petroleum derivatives or have failed due to any other cause. Remove damaged pavement to the full depth of the damage and replace with new asphalt pavement similar to that of the existing pavement in accordance with paragraph 101-3.4b.
- b.** Repair joints and cracks in accordance with paragraph 101-3.2.
- c.** Remove oil or grease that has not penetrated the asphalt pavement by scrubbing with a detergent and washing thoroughly with clean water. After cleaning, treat these areas with an oil spot primer.
- d.** Clean pavement surface immediately prior to placing the surface treatment so that it is free of dust, dirt, grease, vegetation, oil or any type of objectionable surface film.

**101-3.7 Maintenance.** The Contractor shall perform all maintenance work necessary to keep the pavement in a satisfactory condition until the full section is complete and accepted by the RPR. The surface shall be kept clean and free from foreign material. The pavement shall be properly drained at all times. If cleaning is necessary or if the pavement becomes disturbed, any work repairs necessary shall be performed at the Contractor's expense.

**101-3.8 Preparation of Joints in Rigid Pavement prior to resealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the joint and does not damage the joint.

**101-3.8.1 Removal of Existing Joint Sealant.** All existing joint sealants will be removed by plowing or use of hand tools. Any remaining sealant and or debris will be removed by use of wire brushes or other tools as necessary. Resaw joints removing no more than 1/16 inch from each joint face. Immediately after sawing, flush out joint with water and other tools as necessary to completely remove the slurry.

**101-3.8.2 Cleaning prior to sealing.** Immediately before sealing, joints shall be cleaned by removing any remaining laitance and other foreign material. Allow sufficient time to dry out joints prior to sealing. Joint surfaces will be surface-dry prior to installation of sealant.

**101-3.8.3 Joint sealant.** Joint material and installation will be in accordance with Item P-605.

**101-3.9 Preparation of Cracks in Flexible Pavement prior to sealing.** Prior to application of sealant material, clean and dry the joints of all scale, dirt, dust, old sealant, curing compound, moisture and other foreign matter. The Contractor shall demonstrate, in the presence of the RPR, that the method used cleans the cracks and does not damage the pavement.

**101-3.9.1 Preparation of Crack.** Widen crack with router by removing a minimum of 1/16 inch from each side of crack. Immediately before sealing, cracks will be blown out with a hot air lance combined with oil and water-free compressed air.

**101-3.9.2 Removal of Existing Crack Sealant.** Existing sealants will be removed by routing. Following routing any remaining debris will be removed by use of a hot lance combined with oil and water-free compressed air.

**101-3.9.3 Crack Sealant.** Crack sealant material and installation will be in accordance with Item P-605.

**101-3.9.4 Removal of Pipe and other Buried Structures.**

**a. Removal of Existing Pipe Material.** Not used.

**b. Removal of Inlets/Manholes.** Not used.

## METHOD OF MEASUREMENT

**101-4.1 Sawcut Pavement.** The unit of measurement for sawcutting pavement shall be the number of linear feet regardless of thickness.

**101-4.2 Pavement Removal.** The unit of measurement for removal of pavement shall be the number of square yards removed by the Contractor regardless of thickness. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment.

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## BASIS OF PAYMENT

**101-5.1 Payment.** Payment shall be made at contract unit price for the unit of measurement as specified above. This price shall be full compensation for furnishing all materials and for all preparation, hauling, and placing of the material and for all labor, equipment, tools, and incidentals necessary to complete this item.

No. 7, Spec No. P-101-5.1     Sawcut AC Pavement (Full Depth  $\pm 4$ -Inch) – Per Linear Foot

No. 8, Spec No. P-101-5.2     Remove AC Pavement (Full Depth  $\pm 4$ -Inch) – Per Square Yard

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### Advisory Circulars (AC)

AC 150/5380-6     *Guidelines and Procedures for Maintenance of Airport Pavements*

### ASTM International (ASTM)

ASTM D6690     *Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements*

## END OF ITEM P-101

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## Item P-151 Clearing and Grubbing

### DESCRIPTION

**151-1.1** This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the plans or as required by the Resident Project Representative (RPR).

**a. Clearing** shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

**b. 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 RPR 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.

**c. Tree Removal.** Tree Removal shall consist of the cutting and removal of isolated single trees or isolated groups of trees, and the grubbing of stumps and roots. The removal of all the trees of this classification shall be in accordance with the requirements for the particular area being cleared.

### CONSTRUCTION METHODS

**151-2.1 General.** The areas denoted on the plans to be cleared shall be staked on the ground by the Contractor as indicated on the plans.

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 pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the RPR who will notify the proper local authority or owner to secure prompt action.

**151-2.1.1 Disposal.** All materials removed by clearing or by clearing and grubbing shall be disposed of in the designated waste disposal area, except when otherwise directed by the RPR. 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 that 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 RPR and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the RPR permission in writing from the property owner for the use of private property for this purpose.



**151-2.1.2 Blasting.** Blasting shall not be allowed.

**151-2.2 Clearing.** The Contractor shall clear the staked or indicated area of all materials as indicated on the plans. Trees unavoidably falling outside the specified clearing limits must be cut up, removed, and disposed of in a satisfactory manner. To minimize damage to trees that are to be left standing, trees shall be felled toward the center of the area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of as directed by the RPR. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a location designated by the RPR if the fence is to remain the property of a local owner or authority.

**151-2.3 Clearing and grubbing.** In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials as indicated on the plans, shall be removed, except where embankments exceeding 3-1/2 feet in depth will be constructed outside of paved areas. For embankments constructed outside of paved areas, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original 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 shall be disposed of by removal from the site. The cost of removal is incidental to this item. The remaining or existing foundations, wells, cesspools, and like structures shall be destroyed by 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 that cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes in embankment areas remaining after the grubbing operation shall have the sides of the holes flattened to facilitate filling with acceptable material and compacting as required in Item P-152. The same procedure shall be applied to all holes remaining after grubbing in areas where the depth of holes exceeds the depth of the proposed excavation.

## **METHOD OF MEASUREMENT**

**151-3.1** Clearing and grubbing shall be considered incidental to Item P-152 and no separate measurement shall be made.

## **BASIS OF PAYMENT**

**151-4.1** Payment for clearing and grubbing shall be incidental to Item P-152. There will be no separate payment for clearing and grubbing.

## **END OF ITEM P-151**

## Item P-152 Excavation, Subgrade, 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 safety areas, runways, taxiways, aprons, and intermediate areas 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 sections 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.** Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

### CONSTRUCTION METHODS

**152-2.1 General.** Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or 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 RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, 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.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches, to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches in their greatest dimension will not be permitted in the top 6 inches of the subgrade.

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 RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

**a. Blasting.** Blasting shall not be allowed.

**152-2.2 Excavation.** No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot of the stated elevations for ground surfaces, or within 0.04 foot for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times.

When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

**a. Selective grading.** When selective grading is indicated on the plans, the more suitable material designated by the RPR 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 until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.

**b. Undercutting.** Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed off the airport. The cost is incidental to this item. This excavated material shall be paid for at the contract unit price per cubic yard for unsuitable excavation. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.

**c. Over-break.** Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."

**d. Removal of utilities.** The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

**e. Unsuitable Excavation and Replacement, Backfill and Compaction.** If zones of unstable or soft subgrade are found during site grading and proof rolling, the Contractor shall remove the unstable soils to a depth of 24-inches below the finished subgrade, then backfill and compact in accordance with 152-2.10. For wet, suitable subgrade, the soils may be set aside to dry and be re-compacted once they have dried sufficiently. For unsuitable subgrade with a CBR less than 5, crushed aggregate base course material meeting the requirements of Technical Specification P-209 or asphalt millings shall be used for backfill. The work shall only be performed with advance approval of the RPR after the RPR concurs with the Contractor's proposed method. All hauling, work, equipment and material required shall be considered incidental to "Unsuitable Excavation and Replacement, Backfill and Compaction".

**152-2.3 Borrow excavation.** There are no borrow sources within the boundaries of the airport property. The Contractor shall locate and obtain borrow sources, subject to the approval of the RPR. The Contractor shall notify the RPR at least 15 days prior to beginning the excavation so necessary measurements and tests can be made by the RPR. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

**152-2.4 Drainage excavation.** Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final 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.

**152-2.5 Preparation of cut areas or areas where existing pavement has been removed.** In those areas on which a subbase or base course is to be placed, the top 12 inches of subgrade shall be compacted to not less than 95% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

**152-2.6 Preparation of embankment area.** All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

**152-2.7 Control Strip.** The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

**152-2.8 Formation of embankments.** The material shall be constructed in lifts as established in the control strip, but not less than 6 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within  $\pm 2\%$  of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The Contractor's laboratory will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D698. A new Proctor shall be developed for each soil type based on visual classification.

The Contractor's laboratory shall perform all density tests in the presence of the RPR and provide test results upon completion to the Engineer for acceptance. Density tests will be taken for every 3,000 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than 95% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D698. Under all areas to be paved, the embankments shall be compacted to a depth of 8 inches and to a density of not less than 95% of the maximum density as determined by ASTM D698. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches which shall be prepared for a seedbed in accordance with Item T-901.

The in-place field density shall be determined in accordance with ASTM D1556 and ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.



During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches in their greatest dimensions will not be allowed in the top 12 inches of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

**152-2.9 Proof rolling.** The purpose of proof rolling the subgrade is to identify any weak areas in the subgrade and not for compaction of the subgrade. Before start of embankment, and after compaction is completed, the subgrade area shall be proof rolled with a 30-ton Proof Roller with tires spaced not more than 32 inches on-center with tires inflated to 125 psi in the presence of the RPR. Apply a minimum of 3 coverages, or as specified by the RPR under pavement areas. A coverage is defined as the application of one tire print over the designated area. Soft areas of subgrade that deflect more than 1 inch or show permanent deformation greater than 1 inch shall be removed and replaced with suitable material or reworked to conform to the moisture content and compaction requirements in accordance with these specifications. Removal and replacement of soft areas is incidental to this item.

**152-2.10 Compaction requirements.** The subgrade under areas to be paved shall be compacted to a depth of 12 inches and to a density of not less than 95% of the maximum dry density as determined by ASTM D698. On all areas outside the pavement areas, no compaction will be required on the top 4 inches.

The material under areas to be compacted shall be within -3% and +1% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). The material under areas outside the pavement areas to be compacted shall be within -3% and +1% of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the 3/4 inch sieve, follow the methods in ASTM D698. Tests for moisture content and compaction will be taken at a minimum of 3,000 square yards of subgrade. All quality assurance testing shall be done by the Contractor's laboratory in the presence of the RPR, and density test results shall be furnished upon completion to the RPR for acceptance determination.

The in-place field density shall be determined in accordance with ASTM D1556 and ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

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 RPR and the finished subgrade shall be maintained.

**152-2.11 Finishing and protection of subgrade.** Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. 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. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

**152-2.12 Haul.** All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost 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.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

**152-2.13 Surface Tolerances.** In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.



**a. Smoothness.** The finished surface shall not vary more than  $\pm 1/2$  inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

**b. Grade.** The grade and crown shall be measured on a 50-foot grid and shall be within  $\pm 0.05$  feet of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to be placed, grade shall not vary more than 0.10 feet from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

**152-2.14 Topsoil.** When topsoil is specified or required as shown on the plans, it shall be salvaged from stripping or other grading operations. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans. No direct payment will be made for topsoil under Item P-152.

## METHOD OF MEASUREMENT

**152-3.1** Measurement for payment specified by the cubic yard shall be computed by the comparison of digital terrain model (DTM) surfaces. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

**152-3.2** The quantity of unclassified excavation to be paid for shall be the number of cubic yards measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed. Clearing and grubbing per Item P-151 shall be incidental to this item.

**152-3.3** The quantity of unsuitable excavation shall be the number of cubic yards measured in its original position. Measurement shall not include the quantity of materials excavated without authorization, or the quantity of replacement materials used for backfill, regardless of its type or origin.

## BASIS OF PAYMENT

**152-4.1** Unclassified excavation payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item. Clearing and grubbing per Item P-151 shall be incidental to this item.

**152-4.2** For unsuitable excavation, payment shall be made at the contract unit price per cubic yard. This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

- No. 9, Spec No. P-152-4.1    Unclassified Excavation – per Cubic Yard
- No. 10, Spec No. P-152-4.2    Unsuitable Excavation and Replacement, Backfill and Compaction  
– per Cubic Yard
- No. 11, Spec No. P-152-4.3    Compacted Subgrade (12-Inch Depth) – per Square Yard

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

- AASHTO T-180    Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM International (ASTM)

- ASTM D698    Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>))
- ASTM D1556    Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
- ASTM D1557    Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2700 kN-m/m<sup>3</sup>))
- ASTM D6938    Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

Advisory Circulars (AC)

- AC 150/5370-2    Operational Safety on Airports During Construction Software

Software

- FAARFIELD – FAA Rigid and Flexible Iterative Elastic Layered Design

U.S. Department of Transportation

- FAA RD-76-66    Design and Construction of Airport Pavements on Expansive Soils

## END OF ITEM P-152

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## Item P-153 Controlled Low-Strength Material (CLSM)

### DESCRIPTION

**153-1.1** This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Resident Project Representative (RPR).

### MATERIALS

#### 153-2.1 Materials.

- a.** Cement. Cement: ASTM C150 Type II.
- b.** Fly ash. Fly ash shall conform to ASTM C618, Class C or F.
- c.** Fine aggregate (sand). Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces the specified performance characteristics of the CLSM and meets the following requirements, will be accepted.

Sieve Size	Percent Passing by weight
3/4 inch	100
No. 200	0 - 12

- d.** Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

### MIX DESIGN

**153-3.1 Proportions.** The Contractor shall submit to the RPR a mix design including the proportions and source of aggregate, fly ash, cement, water, and approved admixtures. No CLSM mixture shall be produced for payment until the RPR has given written approval of the proportions. The proportions shall be prepared by a laboratory and shall remain in effect for the duration of the project. The proportions shall establish a single percentage or weight for aggregate, fly ash, cement, water, and any admixtures proposed. Laboratory costs are incidental to this item.

- a. Compressive strength.** CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi when tested in accordance with ASTM D4832, with no significant strength gain after 28 days.

**b. Consistency.** Design CLSM to achieve a consistency that will produce an approximate 8-inch diameter circular-type spread without segregation. CLSM consistency shall be determined per ASTM D6103.

## CONSTRUCTION METHODS

### 153-4.1 Placement.

**a. Placement.** CLSM may be placed by any reasonable means from the mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed so structures or pipes are not displaced from their final position and intrusion of CLSM into unwanted areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed by the RPR. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one lift, the base lift shall be free of surface water and loose foreign material prior to placement of the next lift.

**b. Contractor Quality Control.** The Contractor shall collect all batch tickets to verify the CLSM delivered to the project conforms to the mix design. The Contractor shall verify daily that the CLSM is consistent with 153-3.1a and 153-3.1b. Adjustments shall be made as necessary to the proportions and materials as needed. The Contractor shall provide all batch tickets to the RPR.

**c. Limitations of placement.** CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35°F and rising. Mixing and placement shall stop when the air temperature is 40°F and falling or when the anticipated air or ground temperature will be 35°F or less in the 24-hour period following proposed placement. At the time of placement, CLSM shall have a temperature of at least 40°F.

### 153-4.2 Curing and protection

**a. Curing.** The air in contact with the CLSM shall be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32°F, the material may be rejected by the RPR if damage to the material is observed.

**b. Protection.** The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi is obtained. The Contractor shall be responsible for providing evidence to the RPR that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

**153-4.3 Quality Assurance (QA) Acceptance.** CLSM QA acceptance shall be based upon batch tickets provided by the Contractor to the RPR to confirm that the delivered material conforms to the mix design.

## METHOD OF MEASUREMENT

### 153-5.1 Measurement.

No separate measurement for payment shall be made for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

## BASIS OF PAYMENT

### 153-6.1 Payment.

No payment will be made separately or directly for controlled low strength material (CLSM). CLSM shall be considered necessary and incidental to the work of this Contract.

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C33	Standard Specification for Concrete Aggregates
ASTM C150	Standard Specification for Portland Cement
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D4832	Standard Test Method for Preparation and Testing of Controlled Low-Strength Material (CLSM) Test Cylinders
ASTM D6103	Flow Consistency of Controlled Low Strength Material (CLSM)

## END OF ITEM P-153

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## Item P-208 Aggregate Base Course

### DESCRIPTION

**208-1.1** This item shall consist of a base course composed of course aggregate bonded with fine aggregate base. It shall be constructed on a prepared subgrade or subbase course per these specifications and shall conform to the dimensions and typical cross-section shown on the plans.

### MATERIALS

**208-2.1 Aggregate base.** The aggregate base material shall consist of both fine and coarse aggregate. Material shall be clean, sound, durable particles and fragments of stone or gravel, crushed stone, or crushed gravel mixed or blended with sand, screenings, or other materials. Materials shall be handled and stored in accordance with all federal, state, and local requirements. The aggregate shall be free from clay lumps, organic matter, or other deleterious materials or coatings. The method used to produce the crushed gravel shall result in the fractured particles in the finished product as nearly constant and uniform as practicable. The fine aggregate portion, defined as the portion passing the No. 4 sieve produced in crushing operations, shall be incorporated in the base material to the extent permitted by the gradation requirements. Aggregate base material requirements are listed in the following table.

**Aggregate Base Material Requirements**

Material Test	Requirement	Standard
<b>Coarse Aggregate</b>		
Resistance to Degradation	Loss: 50% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium Sulfate - or - 18% maximum using Magnesium Sulfate	ASTM C88
Percentage of Fractured Particles	Minimum 60% by weight of particles with at least two fractured faces and 75% with at least one fractured face <sup>1</sup>	ASTM D5821
Flat Particles, Elongated Particles, or Flat and Elongated Particles	10% maximum, by weight, of flat, elongated, or flat and elongated particles <sup>2</sup>	ASTM D4791
<b>Fine Aggregate</b>		
Liquid limit	Less than or equal to 25	ASTM D4318
Plasticity Index	Not more than five (5)	ASTM D4318

<sup>1</sup> The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

<sup>2</sup> A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).



**208-2.2 Gradation requirements.** The gradation of the aggregate base material shall meet the requirements of the gradation given in the following table when tested per ASTM C117 and ASTM C136. The gradation shall be well graded from coarse to fine and shall not vary from the lower limit on one sieve to the high limit on an adjacent sieve or vice versa.

**Gradation of Aggregate Base**

Sieve Size	Design Range Percentage by Weight passing	Contractor's Final Gradation	Job Control Grading Band Tolerances for Contractor's Final Gradation <sup>1</sup>
2 inch	--		±0
1-1/2 inch	--		±5
1 inch	100		±8
3/4 inch	70-100		±8
No. 4	35-65		±8
No. 40	10-25		±5
No. 200	5-15		±3

- <sup>1</sup> The "Job Control Grading Band Tolerances for Contractor's Final Gradation" in the table shall be applied to "Contractor's Final Gradation" to establish a job control grading band. The full tolerance still applies if application of the tolerances results in a job control grading band outside the design range.

**208-2.3 Sampling and testing.**

**a. Aggregate base materials.** The Contractor shall take samples of the aggregate base in accordance with ASTM D75 to verify initial aggregate base requirements and gradation. Material shall meet the requirements in paragraphs 208-2.1 and 208-2.2. This sampling and testing will be the basis for approval of the aggregate base quality requirements.

**b. Gradation requirements.** The Contractor shall take at least two aggregate base samples per day in the presence of the Resident Project Representative (RPR) to check the final gradation. Sampling shall be per ASTM D75. Material shall meet the requirements in paragraph 208-2.2. The samples shall be taken from the in-place, un-compacted material at sampling points and intervals designated by the RPR.

**208-2.4 Separation Geotextile.** Not used.

## CONSTRUCTION METHODS

**208-3.1 Control strip.** The first half-day of construction shall be considered the control strip. The Contractor shall demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of the specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted or removed and replaced at the Contractor's expense. Full operations shall not continue until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved by the RPR.

**208-3.2 Preparing underlying subgrade and/or subbase.** The underlying subgrade and/or subbase shall be checked and accepted by the RPR before base course placing and spreading operations begin. Re-proof rolling of the subgrade or proof rolling of the subbase in accordance with Item P-152, at the Contractor's expense, may be required by the RPR if the Contractor fails to ensure proper drainage or protect the subgrade and/or subbase. Any ruts or soft, yielding areas due to improper drainage conditions, hauling, or any other cause, shall be corrected before the base course is placed. To ensure proper drainage, the spreading of the base shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope.

**208-3.3 Production.** The aggregate shall be uniformly blended and, when at a satisfactory moisture content per paragraph 208-3.5, the approved material may be transported directly to the placement.

**208-3.4 Placement.** The aggregate shall be placed and spread on the prepared underlying layer by spreader boxes or other devices as approved by the RPR, to a uniform thickness and width. The equipment shall have positive thickness controls to minimize the need for additional manipulation of the material. Dumping from vehicles that require re-handling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

The aggregate shall meet gradation and moisture requirements prior to compaction. The base course layer shall be constructed in lifts as established in the control strip, but not less than 4 inches nor more than 12 inches of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications at the Contractor's expense.

**208-3.5 Compaction.** Immediately upon completion of the spreading operations, compact each layer of the base course, as specified, with approved compaction equipment. The number, type, and weight of rollers shall be sufficient to compact the material to the required density within the same day that the aggregate is placed on the subgrade.

The field density of each compacted lift of material shall be at least 100% of the maximum density of laboratory specimens prepared from samples of the base material delivered to the jobsite. The laboratory specimens shall be compacted and tested in accordance with ASTM D698. The moisture content of the material during placing operations shall be within  $\pm 2$  percentage points of the optimum moisture content as determined by ASTM D698. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**208-3.6 Weather limitations.** Material shall not be placed unless the ambient air temperature is at least 40°F and rising. Work on base course shall not be conducted when the subgrade or subbase is wet or frozen or the base material contains frozen material.

**208-3.7 Maintenance.** The base course shall be maintained in a condition that will meet all specification requirements. When material has been exposed to excessive rain, snow, or freeze-thaw conditions, prior to placement of additional material, the Contractor shall verify that materials still meet all specification requirements. Equipment may be routed over completed sections of base course, provided that no damage results and the equipment is routed over the full width of the completed base course. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at their expense.

**208-3.8 Surface tolerances.** After the course has been compacted, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches, reshaped and recompact to grade until the required smoothness and accuracy are obtained and approved by the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense. The smoothness and accuracy requirements specified here apply only to the top layer when base course is constructed in more than one layer.

**a. Smoothness.** The finished surface shall not vary more than 3/8-inch when tested with a 12-foot straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot straightedge for the full length of each line on a 50-foot grid.

**b. Grade.** The grade and crown shall be measured on a 50-foot grid and shall be within +0 and 1/2 inch of the specified grade.

**208-3.9 Acceptance sampling and testing.** Aggregate base course shall be accepted for density and thickness on an area basis. Two tests will be made for density and thickness for each 500 square yards. Sampling locations will be determined on a random basis per ASTM D3665.

**a. Density.** The Contractor's laboratory shall perform all density tests in the RPR's presence and provide the test results upon completion to the RPR for acceptance.

Each area shall be accepted for density when the field density is at least 100% of the maximum density of laboratory specimens compacted and tested per ASTM D698. The in-place field density shall be determined per ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938. If the specified density is not attained, the area represented by the failed test must be reworked and/or recompact and two additional random tests made. This procedure shall be followed

until the specified density is reached. Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

**b. Thickness.** Depth tests shall be made by test holes at least 3 inches in diameter that extend through the base. The thickness of the base course shall be within +0 and -1/2 inch of the specified thickness as determined by depth tests taken by the Contractor in the presence of the RPR for each area. Where the thickness is deficient by more than 1/2-inch, the Contractor shall correct such areas at no additional cost by scarifying to a depth of at least 3 inches, adding new material of proper gradation, and the material shall be blended and recompact to grade. The Contractor shall replace, at his expense, base material where depth tests have been taken.

## METHOD OF MEASUREMENT

**208-4.1** The quantity of aggregate base course shall be measured by the number of square yards of material actually constructed and accepted by the RPR as complying with the plans and specifications. Base materials shall not be included in any other excavation quantities.

## BASIS OF PAYMENT

**208-5.1** Payment shall be made at the contract unit price per square yards for aggregate base course. This price shall be full compensation for furnishing all materials and for all operations, hauling, placing, and compacting of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

No. 12, Spec No. P-208-5.1 Taxiway Aggregate Base Course (9-Inch Depth) – per Square Yard

No. 13, Spec No. P-208-5.2 Shoulder Aggregate Base Course (6-Inch Depth) – per Square Yard

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates

ASTM D75	Standard Practice for Sampling Aggregates
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft <sup>3</sup> (600 kN-m/m <sup>3</sup> ))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> (2700 kN-m/m <sup>3</sup> ))
ASTM D2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D4643	Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D4751	Standard Test Methods for Determining Apparent Opening Size of a Geotextile
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

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

M288	Standard Specification for Geosynthetic Specification for Highway Applications
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**END OF ITEM P-208**

## Item P-401 Asphalt Mix Pavement

### DESCRIPTION

**401-1.1** This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared base or stabilized course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

### MATERIALS

**401-2.1 Aggregate.** Aggregates shall consist of crushed stone, crushed gravel, crushed slag, screenings, natural sand, and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 sieve. Fine aggregate is the material passing the No. 4 sieve.

**a. Coarse aggregate.** Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

**Coarse Aggregate Material Requirements**

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium Sulfate - or - 18% maximum using Magnesium Sulfate	ASTM C88
Clay lumps and friable particles	1.0% maximum	ASTM C142
Percentage of Fractured Particles	For pavements designed for aircraft gross weights less than 60,000 pounds:  Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face <sup>1</sup>	ASTM D5821
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles at 5:1 <sup>2</sup>	ASTM D4791

<sup>1</sup> The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.

<sup>2</sup> A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

**b. Fine aggregate.** Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the fine aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below.

**Fine Aggregate Material Requirements**

Material Test	Requirement	Standard
Liquid limit	25 maximum	ASTM D4318
Plasticity Index	4 maximum	ASTM D4318
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium Sulfate - or - 15% maximum using Magnesium Sulfate	ASTM C88
Clay lumps and friable particles	1.0% maximum	ASTM C142
Sand equivalent	45 minimum	ASTM D2419

**c. Sampling.** ASTM D75 shall be used in sampling coarse and fine aggregate.

**401-2.2 Mineral filler.** Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

**Mineral Filler Requirements**

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

**401-2.3 Asphalt binder.** Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 70-22.

**Asphalt Binder PG Plus Test Requirements**

Material Test	Requirement	Standard
Elastic Recovery	75% minimum	ASTM D6084 <sup>1</sup>

<sup>1</sup> Follow procedure B on RTFO aged binder.

**401-2.4 Anti-stripping agent.** Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.



## COMPOSITION

**401-3.1 Composition of mixture(s).** The asphalt mix shall be composed of a mixture of aggregates, filler and anti-strip agent if required, and asphalt binder. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

**401-3.2 Job mix formula (JMF) laboratory.** The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF; and be listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Resident Project Representative (RPR) prior to start of construction.

**401-3.3 Job mix formula (JMF).** No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements.

The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 401-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. Samples shall be prepared and compacted using a Marshall compactor in accordance with ASTM D6926 and using the gyratory compactor in accordance with ASTM D6925.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor.

The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least 30 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

- Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 401-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.
- Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 401-2.4.



- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 401-2.1.
- Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.
- Specific Gravity and absorption of each coarse and fine aggregate.
- Percent fractured faces.
- Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
- Percent of asphalt.
- Number of blows or gyrations
- Laboratory mixing and compaction temperatures.
- Supplier-recommended field mixing and compaction temperatures.
- Plot of the combined gradation on a 0.45 power gradation curve.
- Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.
- Tensile Strength Ratio (TSR).
- Type and amount of Anti-strip agent when used.
- Asphalt Pavement Analyzer (APA) results.
- Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

**Table 1. Asphalt Design Criteria**

Test Property	Value	Test Method
Number of blows or gyrations	50	ASTM D6926
Air voids (%)	3.5	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
Tensile Strength Ratio (TSR) <sup>1</sup>	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA) <sup>2</sup>	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

<sup>1</sup> Test specimens for TSR shall be compacted at  $7 \pm 1.0$  % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.

- <sup>2</sup> AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes

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 2 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the sources of supply; be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

**Table 2. Aggregate - Asphalt Pavements**

Sieve Size	Percentage by Weight Passing Sieve
1 inch	--
3/4 inch	100
1/2 inch	90-100
3/8 inch	72-88
No. 4	53-73
No. 8	38-60
No. 16	26-48
No. 30	18-38
No. 50	11-27
No. 100	6-18
No. 200	3-6
<b>Minimum Voids in Mineral Aggregate (VMA)<sup>1</sup></b>	15.0
<b>Asphalt Percent:</b>	
Stone or gravel	5.0-7.5
Slag	6.5-9.5
<b>Recommended Minimum Construction Lift Thickness</b>	2 inch

- <sup>1</sup> To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

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 MS-2 Mix Design Manual, 7th Edition.

**401-3.4 Reclaimed asphalt pavement (RAP).** RAP shall not be used.

**401-3.5 Control Strip.** Full production shall not begin until an acceptable control strip has been constructed and accepted in writing by the RPR. The Contractor shall prepare and place a quantity of asphalt according to the JMF. The underlying grade or pavement structure upon which the control strip is to be constructed shall be the same as the remainder of the course represented by the control strip.

The Contractor will not be allowed to place the control strip until the Contractor quality control program (CQCP), showing conformance with the requirements of paragraph 401-5.1, has been accepted, in writing, by the RPR.

The control strip will consist of at least 250 tons or 1/2 subplot, whichever is greater. The control strip shall be placed in two lanes of the same width and depth to be used in production with a longitudinal cold joint. The cold joint must be cut back in accordance with paragraph 401-4.14 using the same procedure that will be used during production. The cold joint for the control strip will be an exposed construction joint at least four (4) hours old or when the mat has cooled to less than 160°F. The equipment used in construction of the control strip shall be the same type, configuration and weight to be used on the project.

The control strip will be considered acceptable by the RPR if the gradation, asphalt content, and VMA are within the action limits specified in paragraph 401-5.5a; and Mat density greater than or equal to 94.5%, air voids 3.5% +/- 1%, and joint density greater than or equal to 92.5%.

If the control strip is unacceptable, necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made and another control strip shall be placed. Unacceptable control strips shall be removed at the Contractor's expense.

The control strip will be considered one lot for payment based upon the average of a minimum of 3 samples (no sublots required for control strip). Payment will only be made for an acceptable control strip in accordance with paragraph 401-8.1 using a lot pay factor equal to 100.

## CONSTRUCTION METHODS

**401-4.1 Weather limitations.** The asphalt 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 RPR, if requested; however, all other requirements including compaction shall be met.

**Table 4. Surface Temperature Limitations of Underlying Course**

Mat Thickness	Base Temperature (Minimum)
3 inches or greater	40°F
Greater than 2 inches but less than 3 inches	45°F

**401-4.2 Asphalt plant.** Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items.

**a. Inspection of plant.** The RPR, or RPR'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.

**b. Storage bins and surge bins.** The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation, or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

**401-4.3 Aggregate stockpile management.** Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the asphalt batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

**401-4.4 Hauling equipment.** Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

**401-4.4.1 Material transfer vehicle (MTV).** Material transfer vehicles are not required.

**401-4.5 Asphalt pavers.** Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt 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 asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.12.

**401-4.6 Rollers.** The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, clean, and capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt 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.

**401-4.7 Density device.** The Contractor shall have on site a density gauge 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 supply a qualified technician during all paving operations to calibrate the gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

**401-4.8 Preparation of asphalt binder.** The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt binder to the mixer at a uniform temperature. The temperature of unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F when added to the aggregate.

**401-4.9 Preparation of mineral aggregate.** The aggregate for the asphalt shall be heated and dried. 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°F when the asphalt binder is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

**401-4.10 Preparation of Asphalt mixture.** The aggregates and the asphalt binder shall be weighed or metered and mixed in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder 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 D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% 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 asphalt upon discharge shall not exceed 0.5%.

**401-4.11 Application of Prime and Tack Coat.** Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

**401-4.12 Laydown plan, transporting, placing, and finishing.** Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt 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 approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2d before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 12 feet except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least one 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 asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. 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 RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

**401-4.13 Compaction of asphalt mixture.** After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when

the asphalt 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 surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

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 asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

**401-4.14 Joints.** The formation of all joints shall be made 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 asphalt 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 coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F; or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. Asphalt tack coat in accordance with P-603 shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

**401-4.15 Saw-cut grooving.** Saw-cut grooving is not required.

**401-4.16 Diamond grinding.** Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet wide. The saw blades shall be 1/8-inch wide with a sufficient number of blades to create grooves between 0.090 and 0.130 inches wide; and peaks and ridges approximately 1/32 inch higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that cause



ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted. Contractor shall demonstrate to the RPR that the grinding equipment will produce satisfactory results prior to making corrections to surfaces. Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

**401-4.17 Nighttime paving requirements.** The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

## **CONTRACTOR QUALITY CONTROL (CQC)**

**401-5.1 General.** The Contractor shall develop a Contractor Quality Control Program (CQCP) in accordance with Item C-100. No partial payment will be made for materials without an approved CQCP.

**401-5.2 Contractor quality control (QC) facilities.** The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC 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.

**401-5.3 Contractor QC testing.** The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. 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 QC Testing Plan shall be developed as part of the CQCP.

**a. Asphalt content.** A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

**b. Gradation.** Aggregate gradations shall be determined a minimum of twice per day from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136, and ASTM C117.

**c. Moisture content of aggregate.** The moisture content of aggregate used for production shall be determined a minimum of once per day in accordance with ASTM C566.

**d. Moisture content of asphalt.** The moisture content shall be determined once per day in accordance with AASHTO T329 or ASTM D1461.



**e. Temperatures.** Temperatures shall be checked, at least four times per day, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt 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 D2950.

**g. Smoothness for Contractor Quality Control.** The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than 1/4 inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues

The Contractor may use a 12-foot "straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using either the FAA profile program, ProFAA, or FHWA ProVal, using the 12-foot straightedge simulation function.

Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

**1. Transverse measurements.** Transverse measurements shall be taken for each day's production placed. Transverse measurements shall be taken perpendicular to the pavement centerline each 50 feet or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

**2. Longitudinal measurements.** Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests shall be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet; and at the third points of paving lanes when widths of paving lanes are 20 ft or greater. When placement abuts previously placed material the first measurement shall start with one half the length of the straight edge on the previously placed material.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

**h. Grade.** Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to and after the placement of the first lift and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch vertically and 0.1 feet laterally. The documentation will be provided by the Contractor to the RPR by the end of the following working day.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 401-4.16.

The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus 1/2 inch and replacing with new material. Skin patching is not allowed.

**401-5.4 Sampling.** When directed by the RPR, 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.

**401-5.5 Control charts.** The Contractor shall maintain linear control charts for both individual measurements and range (i.e. difference between highest and lowest measurements) for aggregate gradation, asphalt content, and VMA. The VMA for each day will be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and 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 RPR 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, asphalt content, and VMA. 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
3/4 inch	±6%	±9%
1/2 inch	±6%	±9%
3/8 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%
Minimum VMA	-0.5%	-1.0%

**b. Range.** Control charts shall be established to control gradation process variability. The range shall be plotted as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of  $n = 2$ . Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for  $n = 3$  and by 1.27 for  $n = 4$ .

**Control Chart Limits Based on Range**

Sieve	Suspension Limit
1/2 inch	11%
3/8 inch	11%
No. 4	11%
No. 16	9%
No. 50	6%
No. 200	3.5%
Asphalt Content	0.8%

**c. Corrective Action.** The CQCP shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

1. One point falls outside the Suspension Limit line for individual measurements or range; or
2. Two points in a row fall outside the Action Limit line for individual measurements.

**401-5.6 QC reports.** The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with Item C-100.

## MATERIAL ACCEPTANCE

**401-6.1 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 RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

**a. Quality assurance (QA) testing laboratory.** The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

**b. Lot size.** A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

**c. Asphalt air voids.** Plant-produced asphalt will be tested for air voids on a subplot basis.

**1. Sampling.** Material from each subplot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

**2. Testing.** Air voids will be determined for each subplot in accordance with ASTM D3203 for a set of compacted specimens prepared in accordance with ASTM D6926 and ASTM D6925.

**d. In-place asphalt mat and joint density.** Each subplot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

**1. Sampling.** The Contractor will cut minimum 5 inch diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

**2. Bond.** Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

**3. Thickness.** Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each subplot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch less than the thickness

indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or subplot 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 RPR to circumscribe the deficient area.

**4. Mat density.** One core shall be taken from each subplot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot (30 cm) from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each subplot sample by the TMD for that subplot.

**5. Joint density.** One core centered over the longitudinal joint shall be taken for each subplot that has a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

#### **401-6.2 Acceptance criteria.**

**a. General.** Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade and Profilograph roughness.

**b. Air Voids and Mat density.** Acceptance of each lot of plant produced material for mat density and air voids will be based on the percentage of material within specification limits (PWL). If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment will be determined in accordance with paragraph 401-8.1.

**c. Joint density.** Acceptance of each lot of plant produced asphalt for joint density will be based on the PWL. If the PWL of the lot is equal to or exceeds 90%, the lot will be considered acceptable. If the PWL is less than 90%, the Contractor shall evaluate the reason and act accordingly. If the PWL is less than 80%, the Contractor shall cease operations and until the reason for poor compaction has been determined. If the PWL is less than 71%, the pay factor for the lot used to complete the joint will be reduced by five (5) percentage points. This lot pay factor reduction will be incorporated and evaluated in accordance with paragraph 401-8.1.

**d. Grade.** The final finished surface of the pavement shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch vertically or 0.1 feet laterally.

Cross-sections of the pavement shall be taken at a minimum 50-foot longitudinal spacing, at all longitudinal grade breaks, and at start and end of each lane placed. Minimum cross-section grade points shall include grade at centerline,  $\pm 10$  feet of centerline, and edge of taxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the subplot shall not be more than 95%.

**e. Profilograph roughness for QA Acceptance.** The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hours of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate “must grind” bumps and the Profile Index for the pavement using a 0.2-inch blanking band. The bump template must span one inch with an offset of 0.4 inches. The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch equals 25 feet and a vertical scale of one inch equals one inch. Profilograph shall be performed one foot right and left of project centerline and 15 feet right and left of project centerline. Any areas that indicate “must grind” shall be corrected with diamond grinding per paragraph 401-4.16 or by removing and replacing full depth of surface course, as directed by the RPR. Where corrections are necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

**401-6.3 Percentage of material within specification limits (PWL).** The PWL will be determined in accordance with procedures specified in Item C-110. The specification tolerance limits (L) for lower and (U) for upper are contained in Table 5.

**Table 5. Acceptance Limits for Air Voids and Density**

Test Property	Pavements Specification Tolerance Limits	
	L	U
Air Voids Total Mix (%)	2.0	5.0
Surface Course Mat Density (%)	92.8	-
Base Course Mat Density (%)	92.0	-
Joint density (%)	90.5	-

**a. Outliers.** All individual tests for mat density and air voids will be checked for outliers (test criterion) in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded, and the PWL will be determined using the remaining test values. The criteria in Table 5 is based on production processes which have a variability with the following standard deviations: Surface Course Mat Density (%), 1.30; Base Course Mat Density (%), 1.55; Joint Density (%), 1.55.

The Contractor should note that (1) 90 PWL is achieved when consistently producing a surface course with an average mat density of at least 94.5% with 1.30% or less variability, (2) 90 PWL is achieved when consistently producing a base course with an average mat density of at least 94.0% with 1.55% or less variability, and (3) 90 PWL is achieved when consistently producing joints with an average joint density of at least 92.5% with 1.55% or less variability.



**401-6.4 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 RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 401-6.1d and 401-6.2b. Only one resampling per lot will be permitted.

1. A redefined PWL will be calculated for the resampled lot. The number of tests used to calculate the redefined PWL will include the initial tests made for that lot plus the retests.
2. The cost for resampling and retesting shall be borne by the Contractor.

**b. Payment for resampled lots.** The redefined PWL for a resampled lot will be used to calculate the payment for that lot in accordance with Table 6.

**c. Outliers.** Check for outliers in accordance with ASTM E178, at a significance level of 5%.

**METHOD OF MEASUREMENT**

**401-7.1 Measurement.** Asphalt shall be measured by the number of square yards of asphalt used in the accepted work for the depth specified in the plans.

**BASIS OF PAYMENT**

**401-8.1 Payment.** Payment for a lot of asphalt meeting all acceptance criteria as specified in paragraph 401-6.2 shall be made based on results of tests for mat density and air voids. Payment for acceptable lots shall be adjusted according to paragraph 401-8.1c for mat density and air voids; and paragraph 401-6.2c for joint density, subject to the limitation that:

**a.** The total project payment for plant mix asphalt pavement shall not exceed 100 percent of the product of the contract unit price and the total number of square yards of asphalt used in the accepted work.

**b.** 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.

**c. Basis of adjusted payment.** The pay factor for each individual lot shall be calculated in accordance with Table 6. A pay factor shall be calculated for both mat density and air voids. The lot pay factor shall be the higher of the two values when calculations for both mat density and air voids are 100% or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either mat density or air voids is 100% or higher. The lot pay factor shall be the lower of the two values when calculations for both mat density and air voids are less than 100%. If PWL for joint density is less than 71% then the lot pay factor shall be reduced by 5% but be no higher than 95%.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 401-8.1a. Payment in excess of 100% for accepted lots of asphalt shall be used to offset payment for accepted lots of asphalt pavement that achieve a lot pay factor less than 100%.

Payment for sublots which do not meet grade in accordance with paragraph 401-6.2d after correction for over 25% of the subplot shall be reduced by 5%.

**Table 6. Price adjustment schedule<sup>1</sup>**

Percentage of material within specification limits (PWL)	Lot pay factor (percent of contract unit price)
96 – 100	106
90 – 95	PWL + 10
75 – 89	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject <sup>2</sup>

- <sup>1</sup> Although it is theoretically possible to achieve a pay factor of 106% for each lot, actual payment above 100% shall be subject to the total project payment limitation specified in paragraph 401-8.1a.
- <sup>2</sup> The lot shall be removed and replaced. However, the RPR may decide to allow the rejected lot to remain. In that case, if the RPR and Contractor agree in writing that the lot shall not be removed, it shall be paid for at 50% of the contract unit price and the total project payment shall be reduced by the amount withheld for the rejected lot.

**d. Profilograph Roughness.** The Contractor will receive full payment when the profilograph average profile index is in accordance with paragraph 401-6.2e. When the final average profile index for the entire length of pavement does not exceed 15 inches per mile per 1/10 mile, payment will be made at the contract unit price for the completed pavement.

#### **401-8.1 Payment.**

Payment will be made under:

No. 14, Spec No. P-401-8.1 Taxiway Asphalt Surface Course (4-Inch Depth, PG 70-22)  
– per Square Yard

### **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

#### ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density (“Unit Weight”) and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing



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ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity) and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Asphalt Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Asphalt Paving Mixtures
ASTM D1188	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Asphalt Paving Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Asphalt Paving Mixtures
ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5361	Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6084	Standard Test Method for Elastic Recovery of Bituminous Materials by Ductilometer
ASTM D6307	Standard Test Method for Asphalt Content of Hot Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor.
ASTM D6926	Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D6927	Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D6995	Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E1274	Standard Test Method for Measuring Pavement Roughness Using a Profilograph
ASTM E950	Standard Test Method for Measuring the Longitudinal Profile of Traveled Surfaces with an Accelerometer Established Inertial Profiling Reference
ASTM E2133	Standard Test Method for Using a Rolling Inclinator to Measure Longitudinal and Transverse Profiles of a Traveled Surface

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.
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AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T324	Standard Method of Test for Hamburg Wheel-Track Testing of Compacted Asphalt Mixtures
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)

Asphalt Institute (AI)

Asphalt Institute Handbook MS-26, Asphalt Binder  
Asphalt Institute MS-2, Mix Design Manual, 7th Edition  
AI State Binder Specification Database

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder Program

Advisory Circulars (AC)

AC 150/5320-6 Airport Pavement Design and Evaluation

FAA Orders

5300.1 Modifications to Agency Airport Design, Construction, and Equipment Standards

Software

FAARFIELD

**END OF ITEM P-401**

## Item P-403 Asphalt Mix Pavement Surface Course

### DESCRIPTION

**403-1.1** This item shall consist of pavement courses composed of mineral aggregate and asphalt binder 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, crushed slag, screenings, natural sand and mineral filler, as required. The aggregates should have no known history of detrimental pavement staining due to ferrous sulfides, such as pyrite. Coarse aggregate is the material retained on the No. 4 sieve. Fine aggregate is the material passing the No. 4 sieve.

**a. Coarse aggregate.** Coarse aggregate shall consist of sound, tough, durable particles, free from films of matter that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Coarse aggregate material requirements are given in the table below.

**Coarse Aggregate Material Requirements**

Material Test	Requirement	Standard
Resistance to Degradation	Loss: 40% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate - or - 18% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	1.0% maximum	ASTM C142
Percentage of Fractured Particles	Minimum 50% by weight of particles with at least two fractured faces and 65% with at least one fractured face <sup>1</sup>	ASTM D5821
Flat, Elongated, or Flat and Elongated Particles	8% maximum, by weight, of flat, elongated, or flat and elongated particles with a value of 5:1 <sup>2</sup>	ASTM D4791

- <sup>1</sup> The area of each face shall be equal to at least 75% of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces.
- <sup>2</sup> A flat particle is one having a ratio of width to thickness greater than five (5); an elongated particle is one having a ratio of length to width greater than five (5).

**b. Fine aggregate.** Fine aggregate shall consist of clean, sound, tough, durable, angular shaped particles produced by crushing stone, slag, or gravel and shall be free from coatings of clay, silt, or other objectionable matter. Natural (non-manufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. Fine aggregate material requirements are listed in the table below.

#### Fine Aggregate Material Requirements

Material Test	Requirement	Standard
Liquid limit	25 maximum	ASTM D4318
Plasticity Index	4 maximum	ASTM D4318
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 10% maximum using Sodium sulfate - or - 15% maximum using magnesium sulfate	ASTM C88
Clay lumps and friable particles	1.0% maximum	ASTM C142
Sand equivalent	45 minimum	ASTM D2419

**c. Sampling.** ASTM D75 shall be used in sampling coarse and fine aggregate, and ASTM C183 shall be used in sampling mineral filler.

**403-2.2 Mineral filler.** Mineral filler (baghouse fines) may be added in addition to material naturally present in the aggregate. Mineral filler shall meet the requirements of ASTM D242.

#### Mineral filler Requirements

Material Test	Requirement	Standard
Plasticity Index	4 maximum	ASTM D4318

**403-2.3 Asphalt binder.** Asphalt binder shall conform to ASTM D6373 Performance Grade (PG) 70-22.

#### Asphalt Binder PG Plus Test Requirements

Material Test	Requirement	Standard
Elastic Recovery	75% minimum	ASTM D6084 <sup>1</sup>

<sup>1</sup> Follow procedure B on RTFO aged binder.

**403-2.4 Anti-stripping agent.** Any anti-stripping agent or additive (anti-strip) shall be heat stable and shall not change the asphalt binder grade beyond specifications. Anti-strip shall be an approved material of the Department of Transportation of the State in which the project is located.

## COMPOSITION

**403-3.1 Composition of mixture.** The asphalt plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and asphalt binder. 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 (JMF) laboratory.** The laboratory used to develop the JMF shall possess a current certificate of accreditation, listing D3666 from a national accrediting authority and all test methods required for developing the JMF, and listed on the accrediting authority's website. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the RPR prior to start of construction.

**403-3.3 Job mix formula (JMF).** No asphalt mixture shall be placed until an acceptable mix design has been submitted to the RPR for review and accepted in writing. The RPR's review shall not relieve the Contractor of the responsibility to select and proportion the materials to comply with this section.

When the project requires asphalt mixtures of differing aggregate gradations and/or binders, a separate JMF shall be submitted for each mix. Add anti-stripping agent to meet tensile strength requirements. The JMF shall be prepared by an accredited laboratory that meets the requirements of paragraph 403-3.2. The asphalt mixture shall be designed using procedures contained in Asphalt Institute MS-2 Mix Design Manual, 7th Edition. Samples shall be prepared and compacted using a Marshall compactor in accordance with ASTM D6926 and using the gyratory compactor in accordance with ASTM D6925.

Should a change in sources of materials be made, a new JMF must be submitted to the RPR for review and accepted in writing before the new material is used. After the initial production JMF has been approved by the RPR and a new or modified JMF is required for whatever reason, the subsequent cost of the new or modified JMF, including a new control strip when required by the RPR, will be borne by the Contractor. The RPR may request samples at any time for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

The JMF shall be submitted in writing by the Contractor at least 30 days prior to the start of paving operations. The JMF shall be developed within the same construction season using aggregates proposed for project use.

The submitted JMF shall be dated, and stamped or sealed by the responsible professional Engineer of the laboratory and shall include the following items as a minimum:

- Manufacturer's Certificate of Analysis (COA) for the asphalt binder used in the JMF in accordance with paragraph 403-2.3. Certificate of asphalt performance grade is with modifier already added, if used and must indicate compliance with ASTM D6373. For plant modified asphalt binder, certified test report indicating grade certification of modified asphalt binder.
- Manufacturer's Certificate of Analysis (COA) for the anti-stripping agent if used in the JMF in accordance with paragraph 403-2.4.
- Certified material test reports for the course and fine aggregate and mineral filler in accordance with paragraphs 403-2.1 and 403-2.2.

- Percent passing each sieve size for individual gradation of each aggregate cold feed and/or hot bin; percent by weight of each cold feed and/or hot bin used; and the total combined gradation in the JMF.
- Specific Gravity and absorption of each course and fine aggregate.
- Percent fractured faces.
- Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
- Percent of asphalt.
- Number of blows or gyrations.
- Laboratory mixing and compaction temperatures.
- Supplier recommended mixing and compaction temperatures.
- Plot of the combined gradation on the 0.45 power gradation curve.
- Graphical plots of air voids, voids in the mineral aggregate (VMA), and unit weight versus asphalt content. To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.
- Tensile Strength Ratio (TSR).
- Type and amount of Anti-strip agent when used.
- Asphalt Pavement Analyzer (APA) results.
- Date the JMF was developed. Mix designs that are not dated or which are from a prior construction season shall not be accepted.

**Table 1. Asphalt Design Criteria**

Test Property	Value	Test Method
Number of blows/gyrations	50	ASTM D6926
Air voids (%)	3.5	ASTM D3203
Percent voids in mineral aggregate (VMA), minimum	See Table 2	ASTM D6995
TSR <sup>1</sup>	not less than 80 at a saturation of 70-80%	ASTM D4867
Asphalt Pavement Analyzer (APA) <sup>2,3</sup>	Less than 10 mm @ 4000 passes	AASHTO T340 at 250 psi hose pressure at 64°C test temperature

- <sup>1</sup> Test specimens for TSR shall be compacted at  $7 \pm 1.0$  % air voids. In areas subject to freeze-thaw, use freeze-thaw conditioning in lieu of moisture conditioning per ASTM D4867.
- <sup>2</sup> AASHTO T340 at 100 psi hose pressure at 64°C test temperature may be used in the interim. If this method is used the required Value shall be less than 5 mm @ 8000 passes
- <sup>3</sup> Where APA is not available, use Hamburg wheel test (AASHTO T 324) 10mm @ 20,000 passes at 50° C.

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 2 when tested in accordance with ASTM C136 and ASTM C117.

The gradations in Table 2 represent the limits that shall determine the suitability of aggregate for use from the sources of supply, be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa.

**Table 2. Aggregate - Asphalt Pavements**

Sieve Size	Percentage by Weight Passing Sieve
1 inch	--
3/4 inch	100
1/2 inch	90-100
3/8 inch	72-88
No. 4	53-73
No. 8	38-60
No. 16	26-48
No. 30	18-38
No. 50	11-27
No. 100	6-18
No. 200	3-6
<b>Voids in Mineral Aggregate (VMA)<sup>1</sup></b>	15.0
<b>Asphalt Percent:</b>	
Stone or gravel	5.0-7.5
Slag	6.5-9.5
<b>Recommended Minimum Construction Lift Thickness</b>	2 inch

- <sup>1</sup> To achieve minimum VMA during production, the mix design needs to account for material breakdown during production.

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 MS-2 Mix Design Manual, 7th Edition.

**403-3.4 Reclaimed Asphalt Pavement (RAP).** RAP shall not be used.



**403-3.5 Control strip.** A control strip is not required.

## CONSTRUCTION METHODS

**403-4.1 Weather limitations.** The asphalt 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 RPR, if requested; however, all other requirements including compaction shall be met.

**Table 4. Surface Temperature Limitations of Underlying Course**

Mat Thickness	Base Temperature (Minimum)
3 inches or greater	40°F
Greater than 2 inches but less than 3 inches	45°F

**403-4.2 Asphalt plant.** Plants used for the preparation of asphalt shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M156 including the following items:

**a. Inspection of plant.** The RPR, or RPR'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.

**b. Storage bins and surge bins.** The asphalt mixture stored in storage and/or surge bins shall meet the same requirements as asphalt mixture loaded directly into trucks. Asphalt mixture shall not be stored in storage and/or surge bins for a period greater than twelve (12) hours. If the RPR determines there is an excessive heat loss, segregation or oxidation of the asphalt mixture due to temporary storage, temporary storage shall not be allowed.

**403-4.3 Aggregate stockpile management.** Aggregate stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials. Aggregates from different sources shall be stockpiled, weighed and batched separately at the concrete batch plant. Aggregates that have become segregated or mixed with earth or foreign material shall not be used.

A continuous supply of materials shall be provided to the work to ensure continuous placement.

**403-4.4 Hauling equipment.** Trucks used for hauling asphalt shall have tight, clean, and smooth metal beds. To prevent the asphalt from sticking to the truck beds, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other material approved by the RPR. 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.

**403-4.4.1 Material transfer vehicle (MTV).** A material transfer vehicle is not required.

**403-4.5 Asphalt pavers.** Asphalt pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of asphalt 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 asphalt paver shall be equipped with a control system capable of automatically maintaining the specified screed grade and elevation.

If the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued.

The paver shall be capable of paving to a minimum width specified in paragraph 401-4.11.

**403-4.6 Rollers.** The number, type, and weight of rollers shall be sufficient to compact the asphalt to the required density while it is still in a workable condition without crushing of the aggregate, depressions or other damage to the pavement surface. Rollers shall be in good condition, capable of operating at slow speeds to avoid displacement of the asphalt. All rollers shall be specifically designed and suitable for compacting asphalt 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.

**403-4.6.1 Density device.** The Contractor shall have on site a density gauge 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 density gauge and obtain accurate density readings for all new asphalt. These densities shall be supplied to the RPR upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

**403-4.7 Preparation of asphalt binder.** The asphalt binder shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of the unmodified asphalt binder delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325°F when added to the aggregate. The temperature of modified asphalt binder shall be no more than 350°F when added to the aggregate.

**403-4.8 Preparation of mineral aggregate.** The aggregate for the asphalt shall be heated and dried. 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°F when the asphalt binder 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.

**403-4.9 Preparation of asphalt mixture.** The aggregates and the asphalt binder shall be weighed or metered and introduced into the mixer in the amount specified by the JMF. The combined materials shall be mixed until the aggregate obtains a uniform coating of asphalt binder 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 D2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% 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 asphalt upon discharge shall not exceed 0.5%.

**403-4.10 Application of Prime and Tack Coat.** Immediately before placing the asphalt mixture, the underlying course shall be cleaned of all dust and debris.

A tack coat shall be applied in accordance with Item P-603 to all vertical and horizontal asphalt and concrete surfaces prior to placement of the first and each subsequent lift of asphalt mixture.

**403-4.11 Laydown plan, transporting, placing, and finishing.** Prior to the placement of the asphalt, the Contractor shall prepare a laydown plan with the sequence of paving lanes and width to minimize the number of cold joints; the location of any temporary ramps; laydown temperature; and estimated time of completion for each portion of the work (milling, paving, rolling, cooling, etc.). The laydown plan and any modifications shall be approved by the RPR.

Deliveries shall be scheduled so that placing and compacting of asphalt 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 approximately ambient temperature. The Contractor, at their expense, shall be responsible for repair of any damage to the pavement caused by hauling operations.

Contractor shall survey each lift of asphalt surface course and certify to RPR that every lot of each lift meets the grade tolerances of paragraph 401-6.2e before the next lift can be placed.

Edges of existing asphalt pavement abutting the new work shall be saw cut and the cut off material and laitance removed. Apply a tack coat in accordance with P-603 before new asphalt material is placed against it.

The speed of the paver shall be regulated to eliminate pulling and tearing of the asphalt mat. Placement of the asphalt mix shall begin along the centerline of a crowned section or on the high side of areas with a one way slope unless shown otherwise on the laydown plan as accepted by the RPR. The asphalt mix shall be placed in consecutive adjacent lanes having a minimum width of 12 feet except where edge lanes require less width to complete the area. Additional screed sections attached to widen the paver to meet the minimum lane width requirements must include additional auger sections to move the asphalt mixture uniformly along the screed extension.

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 asphalt may be spread and luted by hand tools.

The RPR may at any time, reject any batch of asphalt, on the truck or placed in the mat, which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or overheated asphalt mixture. 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 RPR, and if it can be demonstrated in the laboratory, in the presence of the RPR, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

Areas of segregation in the surface course, as determined by the RPR, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of the construction lift thickness as specified in paragraph 401-3.3, Table 2 for the approved mix design. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

**403-4.12 Compaction of asphalt mixture.** After placing, the asphalt mixture shall be thoroughly and uniformly compacted by self-propelled rollers. The surface shall be compacted as soon as possible when the asphalt 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 surface defects and/or displacement occurring as a result of the roller, or from any other cause, shall be corrected at the Contractor's expense.

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 asphalt to the roller, the wheels shall be equipped with a scraper and kept moistened with water as necessary.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power tampers.

Any asphalt 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.

**403-4.13 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 asphalt 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 coated with an asphalt tack coat before placing any fresh asphalt against the joint.

Longitudinal joints which have been left exposed for more than four (4) hours; the surface temperature has cooled to less than 175°F; or are irregular, damaged, uncompacted or otherwise defective shall be cut back with a cutting wheel or pavement saw a maximum of 3 inches to expose a clean, sound, uniform vertical surface for the full depth of the course. All cutback material and any laitance produced from cutting joints shall be removed from the project. An asphalt tack coat or other product approved by the RPR shall be applied to the clean, dry joint prior to placing any additional fresh asphalt against the joint. The cost of this work shall be considered incidental to the cost of the asphalt.

**403-4.14 Saw-cut grooving.** Saw-cut grooving is not required.

**403-4.15 Diamond grinding.** Diamond grinding shall be completed prior to pavement grooving. Diamond grinding shall be accomplished by sawing with saw blades impregnated with industrial diamond abrasive.

Diamond grinding shall be performed with a machine designed specifically for diamond grinding capable of cutting a path at least 3 feet wide. The saw blades shall be 1/8-inch wide with a minimum of 55 to 60 blades per 12 inches of cutting head width; grooves between 0.090 and 0.130 inches wide; and peaks and ridges approximately 1/32 inch higher than the bottom of the grinding cut. The actual number of blades will be determined by the Contractor and depend on the hardness of the aggregate. Equipment or grinding procedures that causes ravels, aggregate fractures, spalls or disturbance to the pavement will not be permitted.

Grinding will be tapered in all directions to provide smooth transitions to areas not requiring grinding. The slurry resulting from the grinding operation shall be continuously removed and the pavement left in a clean condition. The Contractor shall apply a surface treatment per P-608 to all areas that have been subject to grinding.

**403-4.16 Nighttime Paving Requirements.** The Contractor shall provide adequate lighting during any nighttime construction. A lighting plan shall be submitted by the Contractor and approved by the RPR prior to the start of any nighttime work. All work shall be in accordance with the approved CSPP and lighting plan.

## **CONTRACTOR QUALITY CONTROL (CQC)**

**403-5.1 General.** The Contractor shall develop a CQCP in accordance with Item C-100. No partial payment will be made for materials that are subject to specific QC requirements without an approved CQCP.

**403-5.2 Contractor quality control (QC) facilities.** The Contractor shall provide or contract for testing facilities in accordance with Item C-100. The RPR shall be permitted unrestricted access to inspect the Contractor's QC facilities and witness QC activities. The RPR will advise the Contractor in writing of any noted deficiencies concerning the QC 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.

**403-5.3 Quality Control (QC) testing.** The Contractor shall perform all QC tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved CQCP. 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 QC Testing Plan shall be developed as part of the CQCP.

**a. Asphalt content.** A minimum of two tests shall be performed per day in accordance with ASTM D6307 or ASTM D2172 for determination of asphalt content. When using ASTM D6307, the correction factor shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter. The asphalt content for the day will be determined by averaging the test results.

**b. Gradation.** Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444 and ASTM C136, and ASTM C117.

**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 C566.

**d. Moisture content of asphalt.** The moisture content of the asphalt shall be determined once per lot in accordance with AASHTO T329 or ASTM D1461.

**e. Temperatures.** Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the asphalt binder in the storage tank, the asphalt at the plant, and the asphalt 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 D2950.

**g. Smoothness for Contractor Quality Control.** The Contractor shall perform smoothness testing in transverse and longitudinal directions daily to verify that the construction processes are producing pavement with variances less than 1/4 inch in 12 feet, identifying areas that may pond water which could lead to hydroplaning of aircraft. If the smoothness criteria is not met, appropriate changes and corrections to the construction process shall be made by the Contractor before construction continues.

The Contractor may use a 12-foot straightedge, a rolling inclinometer meeting the requirements of ASTM E2133 or rolling external reference device that can simulate a 12-foot straightedge approved by the RPR. Straight-edge testing shall start with one-half the length of the straightedge at the edge of pavement section being tested and then moved ahead one-half the length of the straightedge for each successive measurement. Testing shall be continuous across all joints. The surface irregularity shall be determined by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between the two high points. If the rolling inclinometer or external reference device is used, the data may be evaluated using the FAA profile program, ProFAA, using the 12-foot straightedge simulation function.



Smoothness readings shall not be made across grade changes or cross slope transitions. The transition between new and existing pavement shall be evaluated separately for conformance with the plans.

**(1) Transverse measurements.** Transverse measurements shall be taken for each day's production placed. Transverse measurements will be taken perpendicular to the pavement centerline each 50 feet (15 m) or more often as determined by the RPR. The joint between lanes shall be tested separately to facilitate smoothness between lanes.

**(2) Longitudinal measurements.** Longitudinal measurements shall be taken for each day's production placed. Longitudinal tests will be parallel to the centerline of paving; at the center of paving lanes when widths of paving lanes are less than 20 feet; and at the third points of paving lanes when widths of paving lanes are 20 ft or greater. When placement abuts previously placed material the first measurement shall start with one half the length of the straight edge on the previously placed material.

Deviations on the final surface course in either the transverse or longitudinal direction that will trap water greater than 1/4 inch shall be corrected with diamond grinding per paragraph 403-4.15 or by removing and replacing the surface course to full depth. Grinding shall be tapered in all directions to provide smooth transitions to areas not requiring grinding. All areas in which diamond grinding has been performed shall be subject to the final pavement thickness tolerances specified in paragraph 401-6.1d(3). Areas that have been ground shall be sealed with a surface treatment in accordance with Item P-608. To avoid the surface treatment creating any conflict with runway or taxiway markings, it may be necessary to seal a larger area.

Control charts shall be kept to show area of each day's placement and the percentage of corrective grinding required. Corrections to production and placement shall be initiated when corrective grinding is required. If the Contractor's machines and/or methods produce significant areas that need corrective actions in excess of 10 percent of a day's production, production shall be stopped until corrective measures are implemented by the Contractor.

**h. Grade.** Grade shall be evaluated daily to allow adjustments to paving operations when grade measurements do not meet specifications. As a minimum, grade shall be evaluated prior to the placement of the first lift and then prior to and after placement of the surface lift.

Measurements will be taken at appropriate gradelines (as a minimum at center and edges of paving lane) and longitudinal spacing as shown on cross-sections and plans. The final surface of the pavement will not vary from the gradeline elevations and cross-sections shown on the plans by more than 1/2 inch (12 mm) vertically and 0.1 feet laterally. The documentation will be provided by the Contractor to the RPR by the end of the following working day.

Areas with humps or depressions that exceed grade or smoothness criteria and that retain water on the surface must be ground off provided the course thickness after grinding is not more than 1/2 inch (12 mm) less than the thickness specified on the plans. Grinding shall be in accordance with paragraph 403-4.15. The Contractor shall repair low areas or areas that cannot be corrected by grinding by removal of deficient areas to the depth of the final course plus 1/2 inch and replacing with new material. Skin patching is not allowed.

**403-5.4 Sampling.** When directed by the RPR, 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.

**403-5.5 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, asphalt content, and VMA. The VMA for each day shall be calculated and monitored by the QC laboratory.

Control charts shall be posted in a location satisfactory to the RPR and 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 RPR 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, asphalt content, and VMA. The control charts shall use the JMF 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
3/4 inch	±6%	±9%
1/2 inch	±6%	±9%
3/8 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%
Minimum VMA	-0.5%	-1.0%

**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  
(n = 2)**

Sieve	Suspension Limit
1/2 inch	11%
3/8 inch	11%
No. 4	11%
No. 16	9%
No. 50	6%
No. 200	3.5%
Asphalt Content	0.8%

**c. Corrective action.** The CQCP 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.

**403-5.6 Quality control (QC) reports.** The Contractor shall maintain records and shall submit reports of QC activities daily, in accordance with the CQCP described in Item C-100.

**MATERIAL ACCEPTANCE**

**403-6.1. Quality Assurance 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 RPR at no cost to the Contractor except that coring as required in this section shall be completed and paid for by the Contractor.

**a. Quality Assurance (QA) testing laboratory.** The QA testing laboratory performing these acceptance tests will be accredited in accordance with ASTM D3666. The QA laboratory accreditation will be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing will be listed on the lab accreditation.

**b. Lot Size.** A standard lot will be equal to one day's production divided into approximately equal sublots of between 400 to 600 tons. When only one or two sublots are produced in a day's production, the sublots will be combined with the production lot from the previous or next day.

Where more than one plant is simultaneously producing asphalt for the job, the lot sizes will apply separately for each plant.

**c. Asphalt air voids.** Plant-produced asphalt will be tested for air voids on a subplot basis.

**(1) Sampling.** Material from each subplot shall be sampled in accordance with ASTM D3665. Samples shall be taken from material deposited into trucks at the plant or at the job site in accordance with ASTM D979. The sample of asphalt may be put in a covered metal tin and placed in an oven for not less than 30 minutes nor more than 60 minutes to maintain the material at or above the compaction temperature as specified in the JMF.

**(2) Testing.** Air voids will be determined for each subplot in accordance with ASTM D3203 for a set of compacted specimens prepared in accordance with ASTM D6926 and ASTM D6925.

**d. In-place asphalt mat and joint density.** Each subplot will be tested for in-place mat and joint density as a percentage of the theoretical maximum density (TMD).

**(1) Sampling.** The Contractor will cut minimum 5 inches diameter samples in accordance with ASTM D5361. The Contractor shall furnish all tools, labor, and materials for cleaning, and filling the cored pavement. Laitance produced by the coring operation shall be removed immediately after coring, and core holes shall be filled within one day after sampling in a manner acceptable to the RPR.

**(2) Bond.** Each lift of asphalt shall be bonded to the underlying layer. If cores reveal that the surface is not bonded, additional cores shall be taken as directed by the RPR to determine the extent of unbonded areas. Unbonded areas shall be removed by milling and replaced at no additional cost as directed by the RPR.

**(3) Thickness.** Thickness of each lift of surface course will be evaluated by the RPR for compliance to the requirements shown on the plans after any necessary corrections for grade. Measurements of thickness will be made using the cores extracted for each subplot for density measurement. The maximum allowable deficiency at any point will not be more than 1/4 inch (6 mm) less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, will not be less than the indicated thickness. Where the thickness tolerances are not met, the lot or subplot 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 RPR to circumscribe the deficient area.

**(4) Mat density.** One core shall be taken from each subplot. Core locations will be determined by the RPR in accordance with ASTM D3665. Cores for mat density shall not be taken closer than one foot from a transverse or longitudinal joint. The bulk specific gravity of each cored sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each subplot sample by the TMD for that subplot.

**(5) Joint density.** One core centered over the longitudinal joint shall be taken for each subplot which contains a longitudinal joint. Core locations will be determined by the RPR in accordance with ASTM D3665. The bulk specific gravity of each core sample will be determined in accordance with ASTM D2726. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each joint density sample by the average TMD for the lot. The TMD used to determine the joint density at joints formed between lots will be the lower of the average TMD values from the adjacent lots.

**403-6.2 Acceptance criteria.**

**a. General.** Acceptance will be based on the implementation of the Contractor Quality Control Program (CQCP) and the following characteristics of the asphalt and completed pavements: air voids, mat density, joint density, grade and Profilograph smoothness.

**b. Air voids.** Acceptance of each lot of plant produced material for air voids will be based upon the average air void from the sublots. If the average air voids of the lot are equal to or greater than 2% and equal to or less than 5%, then the lot will be acceptable. If the average is below 2% or greater than 5%, the lot shall be removed and replaced at the Contractor's expense.

**c. Mat density.** Acceptance of each lot of plant produced material for mat density will 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 94%, the lot will be acceptable. If the average mat density of the lot is below 94%, the lot shall be removed and replaced at the Contractor's expense.

**d. Joint density.** Acceptance of each lot of plant produced asphalt for joint density will 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 92%, the lot will be acceptable. If the average joint density of the lot is less than 92%, 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.

**e. Grade.** The final finished surface of the pavement of the completed project shall be surveyed to verify that the grade elevations and cross-sections shown on the plans do not deviate more than 1/2 inch vertically or 0.1 feet laterally.

Cross-sections of the pavement shall be taken at a minimum 50-foot longitudinal spacing and at all longitudinal grade breaks. Minimum cross-section grade points shall include grade at centerline,  $\pm$  10 feet of centerline, and edge of taxiway pavement.

The survey and documentation shall be stamped and signed by a licensed surveyor. Payment for sublots that do not meet grade for over 25% of the sublot shall not be more than 95%.

**f. Profilograph roughness for QA Acceptance.** The final profilograph shall be the full length of the project to facilitate testing of roughness between lots. The Contractor, in the presence of the RPR shall perform a profilograph roughness test on the completed project with a profilograph meeting the requirements of ASTM E1274 or a Class I inertial profiler meeting ASTM E950. Data and results shall be provided within 48 hours of profilograph roughness tests.

The pavement shall have an average profile index less than 15 inches per mile per 1/10 mile. The equipment shall utilize electronic recording and automatic computerized reduction of data to indicate "must grind" bumps and the Profile Index for the pavement using a 0.2-inch blanking band. The bump template must span one inch with an offset of 0.4 inches. The profilograph must be calibrated prior to use and operated by a factory or State DOT approved, trained operator. Profilograms shall be recorded on a longitudinal scale of one inch equals 25 feet and a vertical scale of one inch equals one inch. Profilograph shall be performed one foot right and left of project centerline and 15 feet right and left of project centerline. Any areas that indicate "must grind" shall be corrected with diamond grinding per paragraph 401-4.15 or by removing and replacing full depth of surface course, as directed by the RPR. Where corrections are

necessary, a second profilograph run shall be performed to verify that the corrections produced an average profile index of 15 inches per mile per 1/10 mile or less.

#### **403-6.3 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 RPR. A retest will consist of all the sampling and testing procedures contained in paragraphs 403-6.1. Only one resampling per lot will be permitted.

**(1)** A redefined mat density will be calculated for the resampled lot. The number of tests used to calculate the redefined mat density will 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 will be used to evaluate the acceptance of that lot in accordance with paragraph 403-6.2.

**c. Outliers.** Check for outliers in accordance with ASTM E178, at a significance level of 5%. Outliers will be discarded and density determined using the remaining test values.

### **METHOD OF MEASUREMENT**

**403-7.1 Measurement.** Plant mix asphalt mix pavement shall be measured by the number of square yards of asphalt pavement used in the accepted work for the depth specified in the plans.

### **BASIS OF PAYMENT**

**403-8.1 Payment.** Payment for a lot of asphalt mixture meeting all acceptance criteria as specified in paragraph 403-6.2 shall be made at the contract unit price per square yard for asphalt. 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:

No. 15, Spec No. P-403-8.1 Shoulder Asphalt Surface Course (3-Inch Depth, PG 70-2) – per Square Yard

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### ASTM International (ASTM)

ASTM C29	Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75- $\mu$ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C131	Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C142	Standard Test Method for Clay Lumps and Friable Particles in Aggregates
ASTM C183	Standard Practice for Sampling and the Amount of Testing of Hydraulic Cement
ASTM C566	Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75	Standard Practice for Sampling Aggregates
ASTM D242	Standard Specification for Mineral Filler for Bituminous Paving Mixtures
ASTM D946	Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
ASTM D979	Standard Practice for Sampling Bituminous Paving Mixtures
ASTM D1073	Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
ASTM D1074	Standard Test Method for Compressive Strength of Bituminous Mixtures
ASTM D1461	Standard Test Method for Moisture or Volatile Distillates in Bituminous Paving Mixtures

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ASTM D2041	Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2172	Standard Test Method for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D2419	Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
ASTM D2489	Standard Practice for Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D2726	Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950	Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3203	Standard Test Method for Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D3381	Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D3665	Standard Practice for Random Sampling of Construction Materials
ASTM D3666	Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D4125	Standard Test Methods for Asphalt Content of Bituminous mixtures by the Nuclear Method
ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4552	Standard Practice for Classifying Hot-Mix Recycling Agents
ASTM D4791	Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D4867	Standard Test Method for Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D5444	Standard Test Method for Mechanical Size Analysis of Extracted Aggregate
ASTM D5581	Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6 inch-Diameter Specimen)

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ASTM D5821	Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6307	Standard Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
ASTM D6373	Standard Specification for Performance Graded Asphalt Binder
ASTM D6752	Standard Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
ASTM D6925	Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the SuperPave Gyratory Compactor
ASTM D6926	Standard Practice for Preparation of Bituminous Specimens Using Marshall Apparatus
ASTM D6927	Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures
ASTM D6995	Standard Test Method for Determining Field VMA based on the Maximum Specific Gravity of the Mix (Gmm)
ASTM E11	Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves
ASTM E178	Standard Practice for Dealing with Outlying Observations
ASTM E2133	Standard Test Method for Using a Rolling Inclinometer to Measure Longitudinal and Transverse Profiles of a Traveled Surface
American Association of State Highway and Transportation Officials (AASHTO)	
AASHTO M156	Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO T329	Standard Method of Test for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method
AASHTO T 340	Standard Method of Test for Determining the Rutting Susceptibility of Hot Mix Asphalt (APA) Using the Asphalt Pavement Analyzer (APA)
Asphalt Institute (AI)	
MS-2	Mix Design Manual, 7th Edition
MS-26	Asphalt Binder Handbook
AI State Binder Specification Database	

FAA Orders

5300.1 Modifications to Agency Airport Design, Construction, and Equipment Standards

Federal Highway Administration (FHWA)

Long Term Pavement Performance Binder program

Software

FAARFIELD

**END OF ITEM P-403**



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## Item P-610 Concrete for Miscellaneous Structures

### DESCRIPTION

**610-1.1** This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

### MATERIALS

**610-2.1 General.** Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure 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 in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

**a. Reactivity.** Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix. If expansion of either the coarse or fine aggregate exceeds 0.08% at 14 days, limit the alkali of the concrete to be less than or equal to 3.0 lb per cubic yard, calculated in accordance with EB 106.

If the expansion is greater than 0.20% the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; aggregates that meet P-501 reactivity test requirements may be utilized.

**610-2.2 Coarse aggregate.** The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

**Coarse Aggregate Grading Requirements**

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1 1/2 inch	467 or 4 and 67
1 inch	57
3/4 inch	67
1/2 inch	7

**610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking.** Not used.

**610-2.3 Fine aggregate.** The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

**610-2.4 Cement.** Cement: ASTM C150, Types I or II.

**610-2.5 Cementitious materials.**

**a. Fly ash.** Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

**b. Slag cement (Ground Granulated Blast Furnace (GGBF)).** Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

**610-2.6 Water.** Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

**610-2.7 Admixtures.** The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR 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.

**a. Air-entraining admixtures.** Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

**b. Water-reducing admixtures.** Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

**c. Other chemical admixtures.** The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

**610-2.8 Premolded joint material.** Premolded joint material for expansion joints shall meet the requirements of ASTM D1751.

**610-2.9 Joint filler.** The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

**610-2.10 Steel reinforcement.** Reinforcing shall consist of reinforcing steel, welded steel wire fabric, or welded deformed steel fabric conforming to the requirements of ASTM A615, ASTM A706, ASTM A775, ASTM A934, ASTM A1064, or ASTM A884.

**610-2.11 Materials for curing concrete.** Curing materials shall consist of white-pigmented Liquid Membrane-Forming Compound, Type 2, Class B conforming to the requirements of ASTM C309.

## 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 here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

**610-3.2 Concrete Mixture.** The concrete shall develop a compressive strength of 4,000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard. The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5%  $\pm$  1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches as determined by ASTM C143.

**610-3.3 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 C94 or ASTM C685.

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 without the RPRs approval. If approval 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 nor more than 100°F. 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 expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

**610-3.4 Forms.** Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown 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 surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

**610-3.5 Placing reinforcement.** All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. 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.

**610-3.6 Embedded items.** Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

**610-3.7 Concrete Consistency.** The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

**610-3.8 Placing concrete.** All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

**610-3.9 Vibration.** Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

**610-3.10 Joints.** Joints shall be constructed as indicated on the plans.

**610-3.11 Finishing.** All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

**610-3.12 Curing and protection.** All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

**610-3.13 Cold weather placing.** When concrete is placed at temperatures below 40°F, follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

**610-3.14 Hot weather placing.** When concrete is placed in hot weather greater than 85°F, follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

## QUALITY ASSURANCE

**610-4.1 Quality Assurance sampling and testing.** Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The RPR will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; test air content in accordance with ASTM C231; make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

**610-4.2 Defective work.** Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

## METHOD OF MEASUREMENT

**610-5.1** Concrete shall be considered incidental and no separate measurement shall be made.

## BASIS OF PAYMENT

**610-6.1** Concrete shall be considered incidental and no separate payment shall be made.

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
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ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing

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ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

## American Concrete Institute (ACI)

ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

**END OF ITEM P-610**



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## Item P-620 Runway and Taxiway Marking

### DESCRIPTION

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

### MATERIALS

**620-2.1 Materials acceptance.** The Contractor shall furnish manufacturer’s certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer’s surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive; and application requirements must be submitted and approved by the Resident Project Representative (RPR) prior to the initial application of markings. The reports can be used for material acceptance or the RPR may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the RPR upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the RPR.

#### 620-2.2 Marking materials.

**Table 1. Marking Materials**

Paint <sup>1</sup>				Glass Beads <sup>2</sup>	
Type	Color	Fed Std. 595 Number	Application Rate Maximum	Type	Application Rate Minimum
Temporary – II	Yellow	33538	230 ft <sup>2</sup> /gal	None	None
II	Yellow	33538	115 ft <sup>2</sup> /gal	III	10 lb/gal
II	Black	37038	115 ft <sup>2</sup> /gal	None	None

<sup>1</sup> See paragraph 620-2.2a

<sup>2</sup> See paragraph 620-2.2b

**a. Paint.** Paint shall be waterborne in accordance with the requirements of this paragraph. Paint colors shall comply with Federal Standard No. 595. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis.

**b. Reflective media.** Glass beads for white and yellow paint shall meet the requirements for Federal Specification TT-B-1325D Type III. Glass beads for red and pink paint shall meet the requirements for Type I, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Type III glass beads shall not be used in red and pink paint.

## CONSTRUCTION METHODS

**620-3.1 Weather limitations.** Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with paragraph 620-2.1. Painting operations shall be discontinued when the ambient or surface temperatures does not meet the manufacturer's recommendations. Markings shall not be applied when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Markings shall not be applied when weather conditions are forecasts to not be within the manufacturers' recommendations for application and dry time.

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

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross-sections and clear-cut edges without running or spattering and without over spray. The marking equipment for both paint and beads shall be calibrated daily.

**620-3.3 Preparation of surfaces.** Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other contaminants that would reduce the bond between the paint and the pavement. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the RPR. After the cleaning operations, sweeping, blowing, or rinsing with pressurized water shall be performed to ensure the surface is clean and free of grit or other debris left from the cleaning process.

**a. Preparation of new pavement surfaces.** The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the RPR to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface.

**b. Preparation of pavement to remove existing markings.** Existing pavement markings shall be removed by rotary grinding, water blasting, or by other methods approved by the RPR minimizing damage to the pavement surface. The removal area may need to be larger than the area of the markings to eliminate ghost markings. After removal of markings on asphalt pavements, apply a seal coat shall extend 1' on all sides of the removal area. Seal coat to 'block out' the removal area to eliminate 'ghost' markings.

**c. Preparation of pavement markings prior to remarking.** Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the RPR. After removal, the surface shall be cleaned of all residue or debris.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufactures application and surface preparation requirements must be submitted to the RPR prior to the initial application of markings.

**620-3.4 Layout of markings.** The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the plans.

**620-3.5 Application.** A period of 30 days shall elapse between placement of surface course or seal coat and application of the permanent paint markings. 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 RPR.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and marking dimensions and spacing shall be within the following tolerances:

**Marking Dimensions and Spacing Tolerance**

Dimension and Spacing	Tolerance
36 inch or less	±1/2 inch
greater than 36 inch to 6 feet	±1 inch
greater than 6 feet to 60 feet	±2 inch
greater than 60 feet	±3 inch

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

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

**620-3.6 Application--preformed thermoplastic airport pavement markings.** Preformed thermoplastic pavement markings not used.

**620-3.7 Control strip.** Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the RPR. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads (per Table 1) that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

**620-3.8 Retro-reflectance.** Not used.

**620-3.9 Protection and cleanup.** After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the RPR. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

## METHOD OF MEASUREMENT

**620-4.1** The quantity of surface preparation shall be measured by the number of square feet for each type of surface preparation specified in paragraph 620-3.3. Seal Coat per Item P-608 shall be incidental to this item.

**620-4.2** The quantity of markings shall be paid for shall be measured by the number of square feet of painting. Reflective media and black paint shall be incidental to this item.

**620-4.3** Reflective media shall not be measured. This shall be considered incidental to the placement of permanent pavement markings.

**620-4.4** Black paint required for outlining surface markings with black borders shall not be measured. This shall be considered incidental to the placement of permanent pavement markings.

**620-4.5** Temporary markings placed prior to re-opening a pavement section for aircraft operations within the 30-day window between paving operations and the placement of permanent markings shall be measured by the number of square feet of painting performed in accordance with the specifications and accepted by the RPR. Temporary markings placed for the purpose of taxiway closures and detours during the phases of the project shall not be measured. Temporary marking includes surface preparation, application and complete removal of the temporary marking.

## BASIS OF PAYMENT

**620-5.1** This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item complete in place and accepted by the RPR in accordance with these specifications.

**620-5.2** Payment for surface preparation shall be made at the contract price for the number of square feet for each type of surface preparation specified in paragraph 620-3.3. Seal Coat per Item P-608 shall be incidental to this item.

**620-5.3** Payment for markings shall be made at the contract price by the number of square feet of painting. Reflective media and black paint shall be incidental to this item.

**620-5.4** Payment for temporary markings shall be made at the contract price for the number of square feet of painting. 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:

No. 16, Spec No. P-620-5.1 Obliterate & Seal Pavement Markings – per Square Foot

No. 17, Spec No. P-620-5.2 Temporary Pavement Marking – per Square Foot

No. 18, Spec No. P-620-5.3 Permanent Pavement Marking – per Square Foot

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### ASTM International (ASTM)

ASTM D476	Standard Classification for Dry Pigmentary Titanium Dioxide Products
ASTM D968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Standard Test Method for Epoxy Content of Epoxy Resins
ASTM D2074	Standard Test Method for Total, Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Standard Test Method for Rubber Property - Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2302	Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

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**Code of Federal Regulations (CFR)**

40 CFR Part 60, Appendix A-7, Method 24

Determination of volatile matter content, water content, density, volume solids,  
and weight solids of surface coatings

29 CFR Part 1910.1200 Hazard Communication

**Federal Specifications (FED SPEC)**

FED SPEC TT-B-1325D Beads (Glass Spheres) Retro-Reflective

FED SPEC TT-P-1952F Paint, Traffic and Airfield Marking, Waterborne

FED STD 595 Colors used in Government Procurement

**Commercial Item Description**

A-A-2886B Paint, Traffic, Solvent Based

**Advisory Circulars (AC)**

AC 150/5340-1 Standards for Airport Markings

AC 150/5320-12 Measurement, Construction, and Maintenance of Skid Resistant Airport  
Pavement Surfaces**END OF ITEM P-620**

## Item T-901 Seeding

### DESCRIPTION

**901-1.1** This item shall consist of soil preparation, seeding, fertilizing and hydromulching the areas shown on the plans or as directed by the RPR in accordance with these specifications.

### MATERIALS

**901-2.1 Seed.** The species and application rates of grass, legume, and cover-crop seed furnished shall be those stipulated herein. Seed shall conform to the requirements of Federal Specification JJJ-S-181, Federal Specification, Seeds, Agricultural.

Seed shall be furnished separately or in mixtures in standard containers labeled in conformance with the Agricultural Marketing Service (AMS) Seed Act and applicable state seed laws with the seed name, lot number, net weight, percentages of purity and of germination and hard seed, and percentage of maximum weed seed content clearly marked for each kind of seed. The Contractor shall furnish the RPR duplicate signed copies of a statement by the vendor certifying that each lot of seed has been tested by a recognized laboratory for seed testing within six (6) months of date of delivery. This statement shall include: name and address of laboratory, date of test, lot number for each kind of seed, and the results of tests as to name, percentages of purity and of germination, and percentage of weed content for each kind of seed furnished, and, in case of a mixture, the proportions of each kind of seed. Wet, moldy, or otherwise damaged seed will be rejected.

Seeds shall be applied as follows:

#### Seed Properties and Rate of Application

Botanical Name	Common Name	Rate of Application lb/acre
<i>Aristida purpurea</i>	Purple three awn	3.0
<i>Bouteloua aristidoides</i>	Needle grama	2.0
<i>Bouteloua barbata</i>	Six weeks grama	1.0
<i>Bouteloua rothrockii</i>	Rothrocks grama	1.0
<i>Plantago insularis</i>	Indian wheat	5.0
<i>Senna couesii</i>	Desert senna	2.0
<i>Sphaeralcea ambigua</i>	Desert globemallow	1.0
<i>Sporobolus cryptandrus</i>	Sand dropseed	1.0
<i>Baileya multiradiata</i>	Desert marigold	1.0
<i>Escholtzia Mexicana</i>	Mexican gold poppy	2.0
<i>Phacelia campanularia</i>	Desert Canterbury bells	2.0
<i>Lesquerella gordonii</i>	Gordons bladderpod	1.0



Seeding shall be performed during the period conducive for growth when considering local climate and soil conditions. The contractor's submittal shall include the recommended time frame for seeding application.

**901-2.2 Lime.** Not required.

**901-2.3 Fertilizer.** Fertilizer shall be standard commercial fertilizers supplied separately or in mixtures containing the percentages of total nitrogen, available phosphoric acid, and water-soluble potash. They shall be applied at the rate and to the depth specified, and shall meet the requirements of applicable state laws. They shall be furnished in standard containers with name, weight, and guaranteed analysis of contents clearly marked thereon. No cyanamide compounds or hydrated lime shall be permitted in mixed fertilizers.

The fertilizers may be supplied in one of the following forms:

- a. A dry, free-flowing fertilizer suitable for application by a common fertilizer spreader;
- b. A finely-ground fertilizer soluble in water, suitable for application by power sprayers; or
- c. A granular or pellet form suitable for application by blower equipment.

Fertilizers shall be 13-13-13 commercial fertilizer and shall be spread at the rate of 250 pounds per acre, unless otherwise modified by the contractor's supplier, based on the seed mix, region, and climate.

**901-2.4 Soil for repairs.** The soil for fill and topsoiling of areas to be repaired shall be at least of equal quality to that which exists in areas adjacent to the area to be repaired. The soil shall be relatively free from large stones, roots, stumps, or other materials that will interfere with subsequent sowing of seed, compacting, and establishing turf, and shall be approved by the RPR before being placed.

## CONSTRUCTION METHODS

**901-3.1 Advance preparation and cleanup.** After grading of areas has been completed and before applying fertilizer and ground limestone, areas to be seeded shall be raked or otherwise cleared of stones larger than 2 inches in any diameter, sticks, stumps, and other debris that might interfere with sowing of seed, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes has occurred after the completion of grading and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage include filling gullies, smoothing irregularities, and repairing other incidental damage.

An area to be seeded shall be considered a satisfactory seedbed without additional treatment if it has recently been thoroughly loosened and worked to a depth of not less than 5 inches as a result of grading operations and, if immediately prior to seeding, the top 3 inches of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

When the area to be seeded is sparsely sodded, weedy, barren and unworked, or packed and hard, any grass and weeds shall first be cut or otherwise satisfactorily disposed of, and the soil then scarified or otherwise loosened to a depth not less than 5 inches. Clods shall be broken and the top 3 inches of soil shall be worked into a satisfactory seedbed by discing, or by use of cultipackers, rollers, drags, harrows, or other appropriate means.

**901-3.2 Dry application method.**

**a. Liming.** Not required.

**b. Fertilizing.** Following advance preparations and cleanup fertilizer shall be uniformly spread at the rate that will provide not less than the minimum quantity stated in paragraph 901-2.3.

**c. Seeding.** Grass seed shall be sown at the rate specified in paragraph 901-2.1 immediately after fertilizing. The fertilizer and seed shall be raked within the depth range stated in the special provisions. Seeds of legumes, either alone or in mixtures, shall be inoculated before mixing or sowing, in accordance with the instructions of the manufacturer of the inoculant. When seeding is required at other than the seasons shown on the plans or in the special provisions, a cover crop shall be sown by the same methods required for grass and legume seeding.

All seed is to be drilled one-quarter ( $\frac{1}{4}$ ) inch to one-half ( $\frac{1}{2}$ ) inch into the soil at the rate of application specified in Table 1 with a mechanical, power-drawn drill seeder. Rows shall be spaced not more than seven (7) inches apart. Contractor shall drill one-half ( $\frac{1}{2}$ ) of the required rate of application in one compass direction, and then drill the remaining half of the required rate of application in a direction ninety degrees ( $90^\circ$ ) to the first half. Drill must be specifically designed to accommodate variability in size and physical characteristics of native rangeland grass seeds. Drill seed hopper shall have an auger to mix seed while drilling. Seed that is extremely small shall be sowed from a separate hopper adjusted to the proper rate of application.

**d. Rolling.** After the seed has been properly covered, the seedbed shall be immediately compacted by means of an approved lawn roller, weighing 40 to 65 pounds per foot of width for clay soil (or any soil having a tendency to pack), and weighing 150 to 200 pounds per foot of width for sandy or light soils.

**901-3.3 Wet application method.**

**a. General.** The Contractor may elect to apply seed and fertilizer (and lime, if required) by spraying them on the previously prepared seedbed in the form of an aqueous mixture and by using the methods and equipment described herein. The rates of application shall be as specified in the special provisions.

**b. Spraying equipment.** The spraying equipment shall have a container or water tank equipped with a liquid level gauge calibrated to read in increments not larger than 50 gallons over the entire range of the tank capacity, mounted so as to be visible to the nozzle operator. The container or tank shall also be equipped with a mechanical power-driven agitator capable of keeping all the solids in the mixture in complete suspension at all times until used.

The unit shall also be equipped with a pressure pump capable of delivering 100 gallons per minute at a pressure of 100 psi. The pump shall be mounted in a line that will recirculate the mixture through the tank whenever it is not being sprayed from the nozzle. All pump passages and pipe lines shall be capable of providing clearance for  $\frac{5}{8}$  inch solids. The power unit for the pump and agitator shall have controls mounted so as to be accessible to the nozzle operator. There shall be an indicating pressure gauge connected and mounted immediately at the back of the nozzle.

The nozzle pipe shall be mounted on an elevated supporting stand in such a manner that it can be rotated through 360 degrees horizontally and inclined vertically from at least 20 degrees below to at least 60 degrees above the horizontal. There shall be a quick-acting, three-way control valve connecting the recirculating line to the nozzle pipe and mounted so that the nozzle operator can control and regulate the amount of flow of mixture delivered to the nozzle. At least three different types of nozzles shall be supplied so that mixtures may be properly sprayed over distance varying from 20 to 100 feet. One shall be a close-range ribbon nozzle, one a medium-range ribbon nozzle, and one a long-range jet nozzle. For case of removal and cleaning, all nozzles shall be connected to the nozzle pipe by means of quick-release couplings.

In order to reach areas inaccessible to the regular equipment, an extension hose at least 50 feet in length shall be provided to which the nozzles may be connected.

**c. Mixtures.** Lime, if required, shall be applied separately, in the quantity specified, prior to the fertilizing and seeding operations. Not more than 220 pounds of lime shall be added to and mixed with each 100 gallons of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds of these combined solids shall be added to and mixed with each 100 gallons of water.

All water used shall be obtained from fresh water sources and shall be free from injurious chemicals and other toxic substances harmful to plant life. The Contractor shall identify to the RPR all sources of water at least two (2) weeks prior to use. The RPR may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the RPR following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within two (2) hours from the time they were mixed or they shall be wasted and disposed of at approved locations.

**d. Spraying.** Lime, if required, shall be sprayed only upon previously prepared seedbeds. After the applied lime mixture has dried, the lime shall be worked into the top 3 inches, after which the seedbed shall again be properly graded and dressed to a smooth finish.

Mixtures of seed and fertilizer shall only be sprayed upon previously prepared seedbeds on which the lime, if required, shall already have been worked in. The mixtures shall be applied by means of a high-pressure spray that shall always be directed upward into the air so that the mixtures will fall to the ground like rain in a uniform spray. Nozzles or sprays shall never be directed toward the ground in such a manner as might produce erosion or runoff.

Particular care shall be exercised to ensure that the application is made uniformly and at the prescribed rate and to guard against misses and overlapped areas. Proper predetermined quantities of the mixture in accordance with specifications shall be used to cover specified sections of known area.

Checks on the rate and uniformity of application may be made by observing the degree of wetting of the ground or by distributing test sheets of paper or pans over the area at intervals and observing the quantity of material deposited thereon.

On surfaces that are to be mulched as indicated by the plans or designated by the RPR, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

**901-3.4 Maintenance of seeded areas.** The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the RPR. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

When either the dry or wet application method outlined above is used for work done out of season, it will be required that the Contractor establish a good stand of grass of uniform color and density to the satisfaction of the RPR. A grass stand shall be considered adequate when bare spots are one square foot or less, randomly dispersed, and do not exceed 3% of the area seeded.

## METHOD OF MEASUREMENT

**901-4.1** The quantity of seeding to be paid for shall be the number of acres measured on the ground surface, completed and accepted.

## BASIS OF PAYMENT

**901-5.1** Payment shall be made at the contract unit price per acre or fraction thereof, which price and payment shall be full compensation for furnishing and placing all material and for all labor, equipment, tools, and incidentals necessary to complete the work prescribed in this item.

Payment will be made under:

No. 19, Spec No. T-901-5.1 Seeding – per Acre

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### ASTM International (ASTM)

ASTM C602      Standard Specification for Agricultural Liming Materials

### Federal Specifications (FED SPEC)

FED SPEC      JJsJ-S-181, Federal Specification, Seeds, Agricultural

### Advisory Circulars (AC)

AC 150/5200-33      Hazardous Wildlife Attractants on or Near Airports

FAA/United States Department of Agriculture

Wildlife Hazard Management at Airports, A Manual for Airport Personnel

**END OF ITEM T-901**

## **DIVISION III**

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## Item L-100 Electrical General Requirements

### DESCRIPTION

**100-1.1 General.** This Item includes furnishing and installing all material, equipment and apparatus, and all labor, tools, services, and equipment required for the removal of portions of the airfield lighting system as shown on the drawings and as follows:

**a.** The demolition, removal and/or salvage of portions of the existing airfield lighting systems including cable, signs and sign bases, and edge lights.

**b.** Temporary Airfield lighting power systems to maintain operation of airfield lighting circuit.

Installation shall be in accordance with Specifications FAA-C-1217 and FAA-C-1391, or as noted on the plans. Perform all work not included in the FAA Specifications in accordance with the National Electrical Code, applicable local and Airport standards, and regulations.

### 100-1.2 Demolition and salvage

**a.** Removal and salvage of airfield electrical elements is included under this item shall include the intent, but not limited to the specific elements, of the following:

**(1)** Remove and salvage existing base mounted taxiway edge lights.

**b.** Any fixtures damaged that are to remain in-place or identified as remove and salvage to Airport on the plans, shall be replaced at Contractor's expense.

**c.** Demolition (removal and non-return to Owner or for re-installation) of other airfield electrical system elements shall include the intent, but not limited to the specific elements, of the following:

**(1)** Power Cables; direct buried or in conduit.

**d.** Demolition (removal and non-return) of other elements associated with the airfield electrical system may also be included under other Items of this project. Elements covered within this specification shall include the intent, but not be limited to the specific elements, of the following:

**(1)** Underground conduits and duct banks, both concrete encased and direct earth buried.

**(2)** Grading and backfill associated with removal of the foregoing elements shall be covered under P-152, "Excavation and Embankment".

### 100-1.3 New construction grading and backfill.

Grading and backfill associated with the removal of existing items or construction of the new ducts and conduits shall be installed in accordance with P-152, "Excavation and Embankment" and GTP 30.03, Concrete for Structures. There will be no separate measurement or payment for any backfill, compaction, restoration or materials for slurry or concrete encased conduits and duct banks but shall be considered incidental to the associated item being installed.



**100-1.4 Related documents.** The General Provisions of the Contract, including General and Special Conditions, apply to work specified in this item.

a. Conflicts between Drawing and Specifications (Contract Documents) and between Contract Documents and references within the Contract Documents: Drawings and specifications are complementary. Work called for by one is binding as if called for by both. Prospective Contractors shall, as part of their proposals, enumerate, identify and list conflicts they find to exist within the Contract Documents, and between these Documents and the rules, regulations, standards and codes of the authority having jurisdiction (Airport Authority, City, County) local Utility companies and local County or State governing bodies. No Allowance shall subsequently be made to the Contractor by reason of his/her failure to have brought said discrepancies to the attention of the Consultant during the bidding period or by reason of any error on the Contractor's part.

b. Execution of Contract is evidence that Contractor has examined all existing conditions, drawings and specifications related to work, and is informed to extent and character of work. Claims made during construction for labor and materials required due to difficulties encountered as a result of Contractor's inattention to this issue, which could have been clarified prior to bid had examination been made, will be denied.

**100-1.5 Temporary lighting and circuits.**

a. Contractor shall coordinate with Airport Maintenance or Operations before the end of each work shift to verify that all airfield lighting circuits are operational. Contractor shall provide all labor and material for this work, non-pay item (NPI).

b. Contractor shall provide and maintain on site, sufficient equipment required to provide temporary lighting and circuit extensions.

c. Work associated with taxiway shall be performed during coordinated taxiway closures in segments, reconnected to remaining existing circuit segments and tested for operation prior to the end of each shift before re-opening taxiway if required to prevent the need for excessive temporary cabling.

**100-1.6 Specifications and standards.** As a supplement to the installation requirements of this item, the following standard specifications and regulations of the issues in effect on the date of this solicitation are incorporated herein by reference and are made a part hereof for electrical work and installation and splicing of underground cables.

NEC National Electrical Code

FAA-STD-019e

Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities

FAA-C-1391c

Installation and Splicing of Underground Cables

Local Governing Bodies' Public Works Department, City of Chandler

Codes and Regulations Maricopa Association of Governments (MAG)

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American Association of State Highway and Transportation Officials (AASHTO)

- (1)** AASHTO LTS-5 (2009; Errata 2009; Amendment 2010) Standard Specifications for Structural Supports for Highway Signs, Luminaries and Traffic Signals.

ASTM International (ASTM)

- (1)** ASTM A123/A123M (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- (2)** ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- (3)** ASTM A575 (1996; R 2007) Standard Specification for Steel Bars, Carbon, Merchant Quality, M-Grades
- (4)** ASTM A576 (1900b; R 2006) Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality

Illuminating Engineering Society of North America (IESNA)

- (1)** IESNA HB-9 (2000; Errata 2004; Errata 2005; Errata 2006) IES Lighting Handbook.

Institute of Electrical and Electronics Engineers (IEEE)

- (1)** IEEE 81 (1983) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System.
- (2)** IEEE C135.1 (1999) Standard for Zinc-Coated Steel Bolts and Nuts for Overhead Line Construction.
- (3)** IEEE C2 (2007; Errata 06-1; TIA 07-1; TIA 07-3, Errata 07-2; TIA 08-4; TIA 08-6; TIA 08-7; TIA 08-8; TIA 08-9; TIA 08-10; TIA 08-11; TIA 09-12; TIA 09-13; TIA 09-14; Errata 09-3; TIA 09-15; TIA 09-16; TIA 10-17) National Electrical Safety Code
- (4)** IEEE Stds Dictionary (2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

National Electrical Manufacturers Association (NEMA)

- (1)** ANSI C136.3 (2005; R 2009) American National Standard for Roadway and Area Lighting Equipment Luminaire Attachments

National Fire Protection Association (NFPA)

- (1)** NFPA 70 (2011; TIA 11-1; Errata 2011) National Electrical Code

ASHRAE/IESNA 90.1, 2004

American Welding Society (AWS)

Factory Mutual Institute Association (FM)

Lightning Protection Institute

International Electrical Testing Association

Underwriters Laboratories (UL)

**(1) UL 467(2007) Grounding and Bonding Equipment**

When required by law or regulations, the government agency having jurisdiction for inspections shall be given reasonable notice and opportunity to inspect the work. Any work that is enclosed or covered up before such inspection and test shall be uncovered at the Contractor's expense: after it has been inspected, the Contractor shall restore the work to its original condition at his own expense.

**100-1.7 Shop drawings and material lists.** Prior to the installation of any material and equipment and within 30 days of contract award, the Contractor shall submit to the Owner for approval electronic PDF copies of manufacturers' brochures containing complete dimensional and performance characteristics, wiring diagrams, installation, and operation instructions, etc., for the equipment listed in the individual L-Series specification Items. Each submittal shall be titled and include the corresponding specification section(s).

A materials list shall be submitted listing each specification paragraph number and stating whether the materials proposed are as specified or are substitutions. If the item is a substitute item, a complete submittal as described in the above paragraph shall be provided for that item.

Submittal data shall be presented in a clear, precise, and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provide they are as a good 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.

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 labeled and titled 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.

## **EQUIPMENT AND MATERIALS**

**100-2.1 Equipment.** Conduits, conduit fittings, conductors, connectors, boxes, and wiring devices shall meet requirements of Specification FAA-C-1217 and Item L-110.

**100-2.2 Conduit, underground.** Conduits run underground are specified in Item L-110 of these specifications. Existing conduit will remain for reuse and installation of new cables as indicated in plans.

**100-2.3 Conduit fittings.** Each conduit and nipple entrance to duct and other such electrical enclosures shall be fitted with double locknuts (one each side of metal penetrated) and insulating bushing. Bushings on 1-1/4 inch and larger conduits shall be insulated metallic, type OZ/Gedney Cat. No. IBC Series, or equal; bushings for 3/4 inch and 1 inch shall be plastic insulated T&B rated for 150 C, or equal. All

insulated bonding and grounding bushings of conduits for 2400 volts or higher voltages, for conduit going underground, and for conduits going into concrete slabs shall be OZ/Gedney Cat. No. IBC-xxL (fitted with grounding lug), or equal. The bushings shall be connected to the grounding system within the terminating enclosure and not on the underground end. The buried end of each conduit shall be fitted with a thermosetting, plastic-insulated, metallic bushing. All openings where conduits enter junction boxes, other enclosures and shelters shall be sealed weather tight. The conduit shall be capped, if left empty, or sealed with Ducseal, or equal, around the conductors for exterior conduits.

**100-2.4 Concrete-encased duct.** Concrete-encased PVC duct shall be as specified in Item L-110.

**100-2.5 Concrete duct markers.** Markers shall be as specified in Item L-110 and as detailed on drawings.

**100-2.6 Concrete handholes.** Hand holes shall be as specified in Item L-115 and as detailed on drawings.

**100-2.7 Light bases and transformer housing.** New light bases, transformer housings, junction cans and covers shall be as specified in AC 150/5345-42, Item L-115 and L-125 and as detailed on drawings.

## CONSTRUCTION METHODS

**100-3.1 Existing utilities.** Prior to any excavation or trenching, Contractor shall provide utility locator or contact Blue Stake to locate any existing cables and utilities, which will be crossed by the trench. Where existing underground utilities are shown on plans to conflict with existing conduit removal and / or new conduit installation, Contractor shall pothole to verify the location and depth. Ensure these utilities are permanently disconnected if they are going to be demolished. The existing service lines shall be exposed by hand digging in those areas that will be crossed and shall be protected from any possible damage. If any damage occurs, it shall be the Contractor's responsibility to immediately repair such damage with materials and methods approved by the Owner and in compliance with applicable codes and standards, at Contractor's expense. Existing utilities to be abandoned shall be removed at the point of crossing as shown on the drawings.

**100-3.2 Demolition.** Airfield Lighting and Signage.

**a.** Removal of existing conductors associated with taxiway(s) that are required to remain active during daytime operations (or as required by Airport) shall be performed in segments during each shift or construction phase, immediately followed by installation of new cable or temporary airfield circuit jumpers, reconnection and testing prior to end of shift to maintain operation of lighting during hours when construction is not occurring.

**b.** Removal of cables associated with lighting or signage that is to remain operational during construction shall be coordinated with Airport. Existing cables may be removed from underground conduits and sleeved with PVC conduit, secured with sandbags to provide temporary power during construction as required for facilitating removal of existing and construction of new duct banks, light bases, sign foundations and hand holes / junction cans.

**c.** Existing L-867 bases for taxiway that are to remain for reinstallation of new fixtures shall be provided with new hardware. Existing mounting bolt hardware will likely require penetrating oil application for removal. Contractor shall be prepared for task of removing existing hardware and broken bolts for installation of new hardware and fixtures on bases that are designated to remain.

- (1)** Coordinate with Airport / Operations for NOTAMs and Lockout / Tag-out of all circuits affected by construction.
- (2)** Remove indicated conduits, ducts and conductors from site and dispose of according to local regulations.
- (3)** Material and equipment not designated for re-installation, including signs, light fixtures and isolation transformers, shall be safely stored to protect from damage during construction then offered for salvage to the appropriate Airport personnel at the end of completion. Non-re-usable material, including conduit, concrete hand holes / pull boxes, foundations, base cans and conductors, shall become the property of the Contractor and shall be removed from the site and disposed of according to Local Ordinances, at Contractor's expense.

**d.** Existing signage that is required to remain operational shall remain in place on existing foundation until installation of new sign is ready to be performed. Removal of existing mounting anchors for replacement with new shall also be included in demolition efforts.

**100-3.3 Conductors.** Installation of underground 5 kV series circuits and parallel circuit conductors are specified in Item L-108 of these specifications.

**100-3.4 Grounding.** All metal support structures, and metal enclosures shall be grounded in accordance with the requirements of the latest edition of Specifications FAA-C-1217, FAA-C-1391, and FAA-STD-019, as indicated in Item L-108 and as detailed on the drawings.

**100-3.5 Ground rods.** Grounding rods shall be 3/4-inch diameter by 10 feet long copper-jacketed steel. Grounding connections to ground rods where buried or encased shall be by the exothermic weld process, Cadweld or equal. Extruded, drawn or stamped-type ground clamps will not be acceptable. The resistance to ground shall not exceed 25 ohms.

**100-3.6 Ground conductors.** Equipment grounding conductors shall be insulated copper, except where shown on the project drawings to be bare, and sized as shown on the project drawings; and all grounds will be shown in accordance with Article 250 of the National Electrical Code, with FAA-STD-019 and Item L-108. Attachment of wire to supports, boxes, etc., shall be accomplished using approved ground lug attached with a separate stainless-steel screw, lock washer and nut. Screws used for support of the electrical enclosure shall not be used for connection of the ground wire. Pipe straps shall not be used for ground purposes.

## **COLOR CODING OF GROUND CONDUCTORS**

### **TYPE OF GROUND CONDUCTOR**

Grounding Electro Conductor  
Counterpoise Conductor  
External Sign and Transformer  
Housing Ground Conductor  
Equipment Grounding Conductor

### **COLOR OF INSULATION**

Bare (solid)- No Insulation  
Bare (solid) – No Insulation  
  
Bare – No Insulation  
Green (safety)

The multi-ground system supplements but does not replace the equipment-grounding conductor required by the National Electrical Code.

Each of these separate ground conductors is insulated in order to keep it distinct and not allow contact with any other conductor.

Electrical continuity of cable armor or shield shall be maintained. Grounding of the cable armor or shield shall be required at all terminations and shall be accomplished by connecting a #6 AWG solid bare copper wire to the cable armor or shield by means of a compression-type ground clamp installed within the terminating enclosure. Armor or shield ground wire shall be connected to the ground electrode conductor using split bolt connector, Burndy or equal. Grounding of direct earth burial (DEB) armored power and shielding control cable shall be at each end in accordance with FAA-C-1391.

**100-3.7 Identification.** Conductors shall be identified as per FAA-C-1217, Section 5.2.5.2.2. Cable tagging and circuit identification markers shall be identified as per FAA-C-1391, Sections 5.12.1 and 5.12.2. Transformers, panelboards, constant current regulators, splice cabinets, enclosures and other vault equipment shall be identified by nameplate of nonferrous metal or rigid plastic, engraved with 3/8-inch high lettering with information as per FAA-C-1217, Section 5.11.

**100-3.8 Contractor testing and submittals.** Equipment and materials list and shop drawings shall be submitted as per FAA-C-1391, Section 3.2. Testing shall be required and performed as per FAA-C-1217, Section 4.8, and FAA-C-1391, Section 3.3.5. The Contractor shall pretest all cable on the reel prior to installation and provide a copy of the test results to the Owner. The Contractor shall be responsible for repairs or replacement of any cable found defective after installation.

The Contractor shall test existing affected circuits prior to start of construction and the installed airfield lighting and miscellaneous power cables at the completion of this project. The results of the testing shall be provided to the Owner for review and acceptance. The Contractor shall be responsible for repairs or replacement of any cable found defective after installation.

Installation tests in addition to all tests contained in other L-Series Items shall be provided as follows:

Item	Test Required	Manufacturer's Rep. Present?
5 kV Rated Airfield Lighting and Power Cables (On the Reel, Not Including Equipment for Contractor Quality Control. Maybe deleted per-coordination with Engineer).	Megger check at 500 to 1000 Volts prior to installation. Values of insulation resistance for each reel shall be noted and given to the Construction Manager/ Owner for acceptance. It is expected that the readings will be greater than 1000 meg-ohms (1 gig-ohm).	No
5 kV Rated Airfield Lighting and Power Cables (All Circuits Installed in This Project)	Megger check at 500 to 1000 volts at the completion of installation. Test every circuit for conductor-to-ground and conductor-to-conductor (between circuits) insulation resistance. Test results shall be tabulated and given to the Construction Manager/Owner for acceptance. It is <u>required</u> that the readings be greater than 100 meg-ohms.	No
5 kV Rated Airfield Lighting and Power Cables (All Circuits Installed in This Project)	Megger check at 500 to 1000 volts at the completion of installation. Test every circuit for conductor-to-ground and conductor-to-conductor (between circuits) insulation resistance. Test results shall be tabulated and given to the Construction Manager/Owner for acceptance.	No
5 kV and 600 Volt and Multi-pair Cables	If a power cable puller is used, continuous-tape pull tension readings for each section of cable shall be provided to the Construction Manager or Owner for review.	No

**100-3.9 Notification of testing.** The Contractor shall notify the project RE and the Airport, a minimum of 48 hours in advance of system, or partial system, testing including, but not limited to, installed cable insulation resistance (megger) testing, and operational testing of any modified lighting circuit.

## METHOD OF MEASUREMENT

**100-4.1 Remove and salvage elevated taxiway edge light and isolation transformer, remove base can.** The quantity to be measured shall be for the removal of existing incandescent, quartz elevated taxiway edge lights, fixture mounting base plates and isolation transformers for storing and protecting safely during construction until reinstallation or return to Airport. This shall also include complete removal and disposal off site of existing concrete encased base cans, fixtures or transformers that Airport does not require returned in accordance with the Plans and Specifications and as accepted.

**100-4.2 Remove and salvage taxiway edge light and isolation transformer, existing base can to remain.** The quantity to be measured shall be for the removal and safe storage of existing runway edge lights to protect from damage within the area of construction. It shall also include protection of designated existing edge lighting fixture bases, in place, per the Plans and Specifications and as accepted.

**100-4.3 Remove existing conductor, conduit to remain.** This item shall consist of removal and disposal off site of existing airfield and apron lighting cable from within existing underground conduits



in accordance with the Plans and Specifications and as accepted. Cable removal is quantified as an effort to remove any number of conductors from within each conduit in a single run or each duct bank conduit. No separate measurement will be made for multiple conductors located in each conduit. No separate measurement will be made for slack.

**100-4.4 Excavate and remove existing conduit and conductor.** This item shall consist of complete removal and disposal off site of airfield lighting cable and complete removal of existing underground conduits in accordance with the Plans and Specifications and as accepted. No separate measurement will be made for multiple conduits in an existing duct bank. No separate measurement will be made for removal of existing airfield cable within conduits designated for removal. This shall also include backfill, compaction and restoration of disturbed area as required.

**100-4.5 Remove existing lighted airfield guidance sign and isolation transformer, demo sign base.** The quantity to be measured shall be for the removal of existing airfield guidance sign and isolation transformer from concrete foundation, excavation for complete removal and disposal from site of concrete sign foundation including backfill, compaction and restoration of disturbed area as required. It shall also include the safe storage of existing signs to protect until they are returned to Airport or disposed of, as required.

**100-4.6 Remove existing lighted airfield guidance sign and isolation transformer, sign base to remain.** The quantity to be measured shall be for the removal of existing airfield guidance sign and isolation transformer from concrete foundation, as required. It shall also include the safe storage of existing signs to protect until they are returned to Airport or disposed of, as required.

## BASIS OF PAYMENT

**100-5.1 Electrical services.** Payment will be made at the contract price for the electrical services completed and accepted. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete these items. The unit price of each of these items shall also include the Contractor's overhead, profit and markup.

Payment will be made under:

No. 20, Spec No. L-100-5.1	Remove and Salvage Existing Taxiway Edge Light and Isolation Transformer Demolish Base Can – per Each
No. 21, Spec No. L-100-5.2	Remove and Salvage Existing Taxiway Edge Light and Isolation Transformer and Return to Owner - Base Can to Remain – per Each
No. 22, Spec No. L-100-5.3	Remove Existing Conductors Back to Next Adjacent Light fixture or Hand Hole, Conduit to Remain– per Linear Foot
No. 23, Spec No. L-100-5.4	Excavate and Remove Existing Conduit and Conductors – per Linear Foot
No. 24, Spec No. L-100-5.5	Remove and Salvage Existing Airfield Guidance Sign and Return to Owner - Remove Concrete Sign Base – per Each



No. 25, Spec No. L-100-5.6

Remove and Salvage Existing Airfield Guidance Sign and Isolation Transformer and Return to Owner, Sign Base to Remain – per Each

**END OF ITEM L-100**

## Item L-108 Underground Power Cable for Airports

### DESCRIPTION

**108-1.1** This item shall consist of furnishing and installing power cables that are direct buried and furnishing and/or installing power cables within conduit or duct banks per these specifications at the locations shown on the plans. It includes excavation and backfill of trench for direct-buried cables only. Also included are the installation of counterpoise wires, ground wires, ground rods and connections, cable splicing, cable marking, cable testing, and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the RPR. This item shall not include the installation of duct banks or conduit, trenching and backfilling for duct banks or conduit, or furnishing or installation of cable for FAA owned/operated facilities.

### EQUIPMENT AND MATERIALS

#### 108-2.1 General.

- a.** Airport lighting equipment and materials covered by advisory circulars (AC) shall be approved under the Airport Lighting Equipment Certification Program per AC 150/5345-53, current version.
- 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 RPR.
- c.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the RPR) and replaced with materials that comply with these specifications at the Contractor's cost.
- d.** All materials and equipment used to construct this item shall be submitted to the RPR 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 products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.
- e.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be electronically submitted in pdf format. The RPR reserves the right to reject any and all equipment, materials, or procedures that do not meet the system design and the standards and codes, specified in this document.
- f.** All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for at least twelve (12) months from the date of 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. The Contractor shall maintain a minimum insulation resistance in accordance with paragraph 108-3.10e with isolation transformers connected in new circuits and new segments of existing circuits through the end of

the contract warranty period when tested in accordance with AC 150/5340-26, Maintenance Airport Visual Aid Facilities, paragraph 5.1.3.1, Insulation Resistance Test.

**108-2.2 Cable.** Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits latest edition. Conductors for use on 6.6 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #8 American wire gauge (AWG), L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. Conductors for use on 20 ampere primary airfield lighting series circuits shall be single conductor, seven strand, #6 AWG, L-824 Type C, 5,000 volts, non-shielded, with cross-linked polyethylene insulation. L-824 conductors for use on the L-830 secondary of airfield lighting series circuits shall be sized in accordance with the manufacturer's recommendations. All other conductors shall comply with FAA and National Electric Code (NEC) requirements. Conductor sizes noted above shall not apply to leads furnished by manufacturers on airfield lighting transformers and fixtures.

Wire for electrical circuits up to 600 volts shall comply with Specification L-824 and/or Commercial Item Description A-A-59544A and shall be type THWN-2, 75°C for installation in conduit and RHW-2, 75°C for direct burial installations. Conductors for parallel (voltage) circuits shall be type and size and installed in accordance with NFPA-70, National Electrical Code.

Unless noted otherwise, all 600-volt and less non-airfield lighting conductor sizes are based on a 75°C, THWN-2, 600-volt insulation, copper conductors, not more than three single insulated conductors, in raceway, in free air. The conduit/duct sizes are based on the use of THWN-2, 600-volt insulated conductors. The Contractor shall make the necessary increase in conduit/duct sizes for other types of wire insulation. In no case shall the conduit/duct size be reduced. The minimum power circuit wire size shall be #12 AWG.

Conductor sizes may have been adjusted due to voltage drop or other engineering considerations. Equipment provided by the Contractor shall be capable of accepting the quantity and sizes of conductors shown in the Contract Documents. All conductors, pigtails, cable step-down adapters, cable step-up adapters, terminal blocks and splicing materials necessary to complete the cable termination/splice shall be considered incidental to the respective pay items provided.

Cable type, size, number of conductors, strand and service voltage shall be as specified in the Contract Document.

**108-2.3 Bare copper wire (counterpoise, bare copper wire ground and ground rods).**

Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG bare solid copper wire for counterpoise and/or No. 6 AWG insulated stranded for grounding bond wire per ASTM B3 and ASTM B8, and shall be bare copper wire. For voltage powered circuits, the equipment grounding conductor shall comply with NEC Article 250.

Ground rods shall be copper-clad steel. The ground rods shall be of the length and diameter specified on the plans, but in no case be less than 10 feet long and 3/4 inch in diameter.

**108-2.4 Cable connections.** In-line connections or splices of underground primary cables shall be of the type called for on the plans, and shall be one of the types listed below. No separate payment will be made for cable connections.

- a. The cast splice. A cast splice, employing a plastic mold and using epoxy resin equivalent to that manufactured by 3MTM Company, "Scotchcast" Kit No. 82-B, or an approved equivalent, used for potting the splice is acceptable.

**b.** The field-attached plug-in splice. Field attached plug-in splices shall be installed as shown on the plans. The Contractor shall determine the outside diameter of the cable to be spliced and furnish appropriately sized connector kits and/or adapters. Tape or heat shrink tubing with integral sealant shall be in accordance with the manufacturer's requirements. Primary Connector Kits manufactured by Amerace, "Super Kit", Integro "Complete Kit", or approved equal is acceptable.

**c.** The factory-molded plug-in splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

**d. The taped or heat-shrink splice.** Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape is acceptable. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Military Specification MIL-I-24391 or Commercial Item Description A-A-55809. Heat shrinkable tubing shall be heavy-wall, self-sealing tubing rated for the voltage of the wire being spliced and suitable for direct-buried installations. The tubing shall be factory coated with a thermoplastic adhesive-sealant that will adhere to the insulation of the wire being spliced forming a moisture- and dirt-proof seal. Additionally, heat shrinkable tubing for multi-conductor cables, shielded cables, and armored cables shall be factory kits that are designed for the application. Heat shrinkable tubing and tubing kits shall be manufactured by Tyco Electronics/ Raychem Corporation, Energy Division, or approved equivalent.

In all the above cases, connections of cable conductors shall be made using crimp connectors using a crimping tool designed to make a complete crimp before the tool can be removed. All L-823/L-824 splices and terminations shall be made per the manufacturer's recommendations and listings.

All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except that a light base ground clamp connector shall be used for attachment to the light base. All exothermic connections shall be made per the manufacturer's recommendations and listings.

**108-2.5 Splicer qualifications.** Every airfield lighting cable splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5,000 volts AC. The Contractor shall submit to the RPR proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

**108-2.6 Concrete.** Concrete shall be proportioned, placed, and cured per GTP 30.03, Concrete for Structures.

**108-2.7 Flowable backfill.** Flowable material used to backfill trenches for power cable trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**108-2.8 Cable identification tags.** Cable identification tags shall be made from a non-corrosive material with the circuit identification stamped or etched onto the tag. The tags shall be of the type as detailed on the plans.

**108-2.9 Tape.** Electrical tapes shall be Scotch™ Electrical Tapes –Scotch™ 88 (1-1/2-inch wide) and Scotch™ 130C® linerless rubber splicing tape (2-inch wide), as manufactured by the Minnesota Mining and Manufacturing Company (3M™), or an approved equivalent.

**108-2.10 Electrical coating.** Electrical coating shall be Scotchkote™ as manufactured by 3M™, or an approved equivalent.

**108-2.11 Existing circuits.** Whenever the scope of work requires connection to an existing circuit, the existing circuit's insulation resistance shall be tested, in the presence of the RPR. The test shall be performed per this item and prior to any activity that will affect the respective circuit. The Contractor shall record the results on forms acceptable to the RPR. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the RPR. The Contractor shall record the results on forms acceptable to the RPR. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the existing circuit to bring the second reading above the first reading. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers and L-824 cable, if necessary, shall be borne by the Contractor. All test results shall be submitted in the Operation and Maintenance (O&M) Manual

**108-2.12 Detectable warning tape.** Plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit and lighting cable) with continuous legend tape shall be polyethylene film with a metalized foil core and shall be 3-6 inches wide. Detectable tape is incidental to the respective bid item. Detectable warning tape for communication cables shall be orange. Detectable warning tape color code shall comply with the APWA Uniform Color Code.

## CONSTRUCTION METHODS

**108-3.1 General.** The Contractor shall install the specified cable at the approximate locations indicated on the plans. Unless otherwise shown on the plans, all cable required to cross under pavements expected to carry aircraft loads shall be installed in concrete encased duct banks. Cable shall be run without splices, from fixture to fixture.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections unless otherwise authorized in writing by the RPR or shown on the plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the plans. Cable circuit identification markers shall be installed on both sides of the L-823 connectors installed and on both sides of slack loops where a future connector would be installed.

Provide not less than 3 feet of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least one foot vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the RPR.

Primary airfield lighting cables installed shall have cable circuit identification markers attached on both sides of each L-823 connector and on each airport lighting cable entering or leaving cable access points, such as manholes, hand holes, pull boxes, junction boxes, etc. Markers shall be of sufficient length for imprinting the cable circuit identification legend on one line, using letters not less than 1/4 inch in size. The cable circuit identification shall match the circuits noted on the construction plans.

**108-3.2 Installation in duct banks or conduits.** This item includes the installation of the cable in duct banks or conduit per the following paragraphs. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be per the latest version of the National Electric Code, or the code of the local agency or authority having jurisdiction.

The Contractor shall make no connections or splices of any kind in cables installed in conduits or duct banks.

Unless otherwise designated in the plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

Duct banks or conduits shall be installed as a separate item per Item L-110, Airport Underground Electrical Duct Banks and Conduit. The Contractor shall run a mandrel through duct banks or conduit prior to installation of cable to ensure that the duct bank or conduit is open, continuous and clear of debris. The mandrel size shall be compatible with the conduit size. The Contractor shall swab out all conduits/ducts and clean light bases, manholes, etc., interiors immediately prior to pulling cable. Once cleaned and swabbed, the light bases and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, light bases, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the RPR of any blockage in the existing ducts.

The cable shall be installed in a manner that prevents harmful stretching of the conductor, damage to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape providing moisture-tight mechanical protection with minimum bulk, or alternately, heat shrinkable tubing before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a conduit, all cable shall be pulled in the conduit at the same time. The pulling of a cable through duct banks or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall not exceed the cable manufacturer's recommendations. A non-hardening cable-pulling lubricant recommended for the type of cable being installed shall be used where required.

The Contractor shall submit the recommended pulling tension values to the RPR prior to any cable installation. If required by the RPR, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the RPR. Cable pull tensions shall be recorded by the Contractor and reviewed by the RPR. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

The manufacturer's minimum bend radius or NEC requirements (whichever is more restrictive) shall apply. Cable installation, handling and storage shall be per manufacturer's recommendations. During cold weather, particular attention shall be paid to the manufacturer's minimum installation temperature. Cable shall not be installed when the temperature is at or below the manufacturer's minimum installation temperature. At the Contractor's option, the Contractor may submit a plan, for review by the RPR, for heated storage of the cable and maintenance of an acceptable cable temperature during installation when temperatures are below the manufacturer's minimum cable installation temperature.

Cable shall not be dragged across base can or manhole edges, pavement or earth. When cable must be coiled, lay cable out on a canvas tarp or use other appropriate means to prevent abrasion to the cable jacket.

**108-3.3 Installation of direct-buried cable in trenches. [NOT USED]** Unless otherwise specified, the Contractor shall not use a cable plow for installing the cable. Cable shall be unreeled uniformly in place alongside or in the trench and shall be carefully placed along the bottom of the trench. The cable shall not be unreeled and pulled into the trench from one end. Slack cable sufficient to provide strain relief shall be placed in the trench in a series of S curves. Sharp bends or kinks in the cable shall not be permitted.



Where cables must cross over each other, a minimum of 3 inches vertical displacement shall be provided with the topmost cable depth at or below the minimum required depth below finished grade.

**a. Trenching.** Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of surface is disturbed. Graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 18 inches (0.5 m) below finished grade per NEC Table 300.5, except as follows:

- When off the airport or crossing under a roadway or driveway, the minimum depth shall be 36 inches unless otherwise specified.
- Minimum cable depth when crossing under a railroad track, shall be 42 inches unless otherwise specified.

The Contractor shall excavate all cable trenches to a width not less than 6 inches. Unless otherwise specified on the plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. Flowable backfill material may alternatively be used.

Duct bank or conduit markers temporarily removed for trench excavations shall be replaced as required.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

**(1)** Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred.

**(2)** Trenching, etc., in cable areas shall then proceed, with approval of the RPR, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair or replacement.

**b. Backfilling.** After the cable has been installed, the trench shall be backfilled. The first layer of backfill in the trench shall encompass all cables; be 3 inches deep, loose measurement; and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. This layer shall not be compacted. The second layer shall be 5 inches deep, loose measurement, and shall contain no particles that would be retained on a one-inch sieve. The remaining third and subsequent layers of backfill shall not exceed 8 inches of loose measurement and be excavated or imported material and shall not contain stone or aggregate larger than 4 inches maximum diameter.

The second and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent material. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557 or backfilled with controlled low strength material (CLSM) in accordance with P-153 as indicated on plans.

Trenches shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when turf is to be established over the trench, the backfilling shall be stopped at an appropriate depth consistent with the type of turfing operation

to be accommodated. A proper allowance for settlement shall also be provided. Any excess excavated material shall be removed and disposed of per the plans and specifications.

Underground electrical warning (caution) tape shall be installed in the trench above all direct-buried cable. Contractor shall submit a sample of the proposed warning tape for acceptance by the RPR. If not shown on the plans, the warning tape shall be located 6 inches above the direct-buried cable or the counterpoise wire if present. A 3-6-inch-wide polyethylene film detectable tape, with a metalized foil core, shall be installed above all direct buried cable or counterpoise. The tape shall be of the color and have a continuous legend as indicated on the plans. The tape shall be installed 8 inches minimum below finished grade.

**c. Restoration.** Following restoration of all trenching near airport movement surfaces, the Contractor shall visually inspect the area for foreign object debris (FOD) and remove any that is found. Where soil and sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by work shall be restored to its original condition. The restoration shall include the sodding, top soiling, fertilizing, liming, seeding, sprigging, or mulching as shown on the plans. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. When trenching is through paved areas, restoration shall be equal to existing conditions. If the cable is to be installed in locations or areas where other compaction requirements are specified (under pavements, embankments, etc.) the backfill compaction shall be to a minimum of 100 percent of ASTM D1557 or backfilled with controlled low strength material (CLSM) in accordance with P-153 as indicated in plans. Restoration shall be considered incidental to the pay item of which it is a component part.

**108-3.4 Cable markers for direct-buried cable.** The location of direct buried circuits shall be marked by a concrete slab marker, 2 feet square and 4-6-inch-thick, extending approximately one inch above the surface. Each cable run from a line of lights and signs to the equipment vault shall be marked at approximately every 200 feet along the cable run, with an additional marker at each change of direction of cable run. All other direct-buried cable shall be marked in the same manner. Cable markers shall be installed directly above the cable. The Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches high and 3 inches wide, with width of stroke 1/2 inch and 1/4 inch deep. Stencils shall be used for cable marker lettering; no hand lettering shall be permitted.

At the location of each underground cable connection/splice, except at lighting units, or isolation transformers, a concrete marker slab shall be installed to mark the location of the connection/splice. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab as directed by the RPR. All cable markers and splice markers shall be painted international orange. Paint shall be specifically manufactured for uncured exterior concrete. After placement, all cable or splice markers shall be given one coat of high-visibility aviation orange paint as approved by the RPR. Furnishing and installation of cable markers is incidental to the respective cable pay item.

**108-3.5 Splicing.** Connections of the type shown on the plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

**a. Cast splices.** These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured per the manufacturer's instructions and to the satisfaction of the RPR.

**b. Field-attached plug-in splices.** These shall be assembled per the manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint (2) Covered with heat shrinkable tubing with integral sealant extending



at least 1-1/2 inches on each side of the joint or (3) On connector kits equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**c. Factory-molded plug-in splices.** These shall be made by plugging directly into mating connectors. The joint where the connectors come together shall be finished by one of the following methods: (1) Wrapped with at least one layer of rubber or synthetic rubber tape and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint. (2) Covered with heat shrinkable tubing with integral sealant extending at least 1-1/2 inches on each side of the joint. or (3) On connector kits so equipped with water seal flap; roll-over water seal flap to sealing position on mating connector.

**d. Taped or heat-shrink splices.** A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch of bare conductor on each side of the connector. Prior to splicing, the two ends of the cable insulation shall be penciled using a tool designed specifically for this purpose and for cable size and type. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches on each end) is clean. After scraping, wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape, stretching it just short of its breaking point. The manufacturer's recommendation for stretching tape during splicing shall be followed. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately one inch over the original jacket. Cover rubber tape with two layers of vinyl pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering, or splice boxes are required.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminants prior to application.

**e. Assembly.** Surfaces of equipment or conductors being terminated or connected shall be prepared in accordance with industry standard practice and manufacturer's recommendations. All surfaces to be connected shall be thoroughly cleaned to remove all dirt, grease, oxides, nonconductive films, or other foreign material. Paints and other nonconductive coatings shall be removed to expose base metal. Clean all surfaces at least 1/4 inch beyond all sides of the larger bonded area on all mating surfaces. Use a joint compound suitable for the materials used in the connection. Repair painted/coated surface to original condition after completing the connection.

### **108-3.6 Bare counterpoise wire installation for lightning protection and grounding.**

If shown on the plans or included in the job specifications, bare solid #6 AWG copper counterpoise wire shall be installed for lightning protection of the underground cables. The RPR shall select one of two methods of lightning protection for the airfield lighting circuit based upon sound engineering practice and lightning strike density.

**a. Equipotential.** – may be used by the RPR for areas that have high rates of lightning strikes. The counterpoise size is determined by the RPR. The equipotential method is applicable to all airfield lighting systems, i.e. runway, taxiway, apron – touchdown zone, centerline, edge, threshold, and approach lighting systems. The equipotential method is also successfully applied to provide lightning protection for power,

signal, and communication systems. The light bases, counterpoise, etc. – all components - are bonded together and bonded to the vault power system ground loop/electrode.

Counterpoise wire shall be installed in the same trench for the entire length of buried cable, conduits and duct banks that are installed to contain airfield cables. The counterpoise is centered over the cable/conduit/duct to be protected.

The counterpoise conductor shall be installed no less than 8 inches minimum or 12 inches maximum above the raceway or cable to be protected, except as permitted below:

**(1)** The minimum counterpoise conductor height above the raceway or cable to be protected shall be permitted to be adjusted subject to coordination with the airfield lighting and pavement designs.

**(2)** The counterpoise conductor height above the protected raceway(s) or cable(s) shall be calculated to ensure that the raceway or cable is within a 45-degree area of protection, (45 degrees on each side of vertical creating a 90-degree angle).

The counterpoise conductor shall be bonded to each metallic light base, mounting stake, and metallic airfield lighting component.

All metallic airfield lighting components in the field circuit on the output side of the constant current regulator (CCR) or other power source shall be bonded to the airfield lighting counterpoise system.

All components rise and fall at the same potential, with no potential difference, no damaging arcing and no damaging current flow.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Equipotential Method of lightning protection.

Reference FAA STD-019E, Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment, Part 4.1.1.7.

**b. Isolation** – used in areas where lightning strikes are not common. Counterpoise size is selected by the RPR. The isolation method is an alternate method for use only with edge lights installed in turf and stabilized soils and raceways installed parallel to and adjacent to the edge of the pavement. NFPA 780 uses 15 feet to define “adjacent to”.

The counterpoise conductor shall be installed 8 inches (203 mm) minimum below grade. The counterpoise is not connected to the light base or mounting stake. An additional grounding electrode is required at each light base or mounting stake. The grounding electrode is bonded to the light base or mounting stake with a 6 AWG solid copper conductor.

See AC 150/5340-30, Design and Installation Details for Airport Visual Aids and NFPA 780, Standard for the Installation of Lightning Protection Systems, Chapter 11, for a detailed description of the Isolation Method of lightning protection.

**c. Common installation requirements.** When a metallic light base is used, the grounding electrode shall be bonded to the metallic light base or mounting stake with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

When a nonmetallic light base is used, the grounding electrode shall be bonded to the metallic light fixture or metallic base plate with a No. 6 AWG bare, annealed or soft drawn, solid copper conductor.

Grounding electrodes may be rods, ground dissipation plates, radials, or other electrodes listed in the NFPA 70 (NEC) or NFPA 780.

Where raceway is installed by the directional bore, jack and bore, or other drilling method, the counterpoise conductor shall be permitted to be installed concurrently with the directional bore, jack and bore, or other drilling method raceway, external to the raceway or sleeve.

The counterpoise wire shall also be exothermically welded to ground rods installed as shown on the plans but not more than 500 feet apart around the entire circuit. The counterpoise system shall be continuous and terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment external ground ring or other made electrode-grounding system. The connections shall be made as shown on the plans and in the specifications.

Where an existing airfield lighting system is being extended or modified, the new counterpoise conductors shall be interconnected to existing counterpoise conductors at each intersection of the new and existing airfield lighting counterpoise systems.

**d. Parallel voltage systems.** Provide grounding and bonding in accordance with NFPA 70, National Electrical Code.

**108-3.7 Counterpoise installation above multiple conduits and duct banks.** Counterpoise wires shall be installed above multiple conduits/duct banks for airfield lighting cables, with the intent being to provide a complete area of protection over the airfield lighting cables. When multiple conduits and/or duct banks for airfield cable are installed in the same trench, the number and location of counterpoise wires above the conduits shall be adequate to provide a complete area of protection measured 45 degrees each side of vertical.

Where duct banks pass under pavement to be constructed in the project, the counterpoise shall be placed above the duct bank. Reference details on the construction plans.

**108-3.8 Counterpoise installation at existing duct banks.** When airfield lighting cables are indicated on the plans to be routed through existing duct banks, the new counterpoise wiring shall be terminated at ground rods at each end of the existing duct bank where the cables being protected enter and exit the duct bank. The new counterpoise conductor shall be bonded to the existing counterpoise system.

**108-3.9 Exothermic bonding.** Bonding of counterpoise wire shall be by the exothermic welding process or equivalent method accepted by the RPR. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the RPR, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

**a.** All slag shall be removed from welds.

**b.** Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See AC 150/5340-30 for galvanized light base exception.

**c.** If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M™ Scotchkote™, or approved equivalent, or coated with coal tar Bitumastic® material to prevent surface exposure to corrosive soil or moisture.

**108-3.10 Testing.** The Contractor shall furnish all necessary equipment and appliances for testing the airport electrical systems and underground cable circuits before and after installation. The Contractor shall perform all tests in the presence of the RPR. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the RPR. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase. The Contractor must maintain the test results throughout the entire project as well as during the warranty period that meet the following:

**a.** Earth resistance testing methods shall be submitted to the RPR for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the RPR. All such testing shall be at the sole expense of the Contractor.

**b.** Should the counterpoise or ground grid conductors be damaged or suspected of being damaged by construction activities the Contractor shall test the conductors for continuity with a low resistance ohmmeter. The conductors shall be isolated such that no parallel path exists and tested for continuity. The RPR shall approve of the test method selected. All such testing shall be at the sole expense of the Contractor.

After installation, the Contractor shall test and demonstrate to the satisfaction of the RPR the following:

**c.** That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

**d.** That all affected circuits (existing and new) are free from unspecified grounds.

**e.** That the insulation resistance to ground of all new non-grounded high voltage series circuits or cable segments is not less than 100 megohms. Verify continuity of all series airfield lighting circuits prior to energization.

**f.** That the insulation resistance to ground of all new non-grounded conductors of new multiple circuits or circuit segments is not less than 100 megohms.

**g.** That all affected circuits (existing and new) are properly connected per applicable wiring diagrams.

**h.** That all affected circuits (existing and new) are operable. Tests shall be conducted that include operating each control not less than 10 times and the continuous operation of each lighting and power circuit for not less than 1/2 hour.

**i.** That the impedance to ground of each ground rod does not exceed 25 ohms prior to establishing connections to other ground electrodes. The fall-of-potential ground impedance test shall be used, as described by American National Standards Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81, to verify this requirement. As an alternate, clamp-on style ground impedance test meters may be used to satisfy the impedance testing requirement. Test equipment and its calibration sheets shall be submitted for review and approval by the RPR prior to performing the testing.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the RPR. Where connecting new cable to existing cable, insulation resistance tests shall be performed on the new cable prior to connection to the existing circuit.

There are no approved "repair" procedures for items that have failed testing other than complete replacement.

## **METHOD OF MEASUREMENT**

**108-4.1** Cable installed in duct bank or conduit shall be measured by the number of linear feet installed with primary connector kits, grounding conductor and grounding connectors ready for operation, and accepted by Owner / Engineer. Separate measurement shall be made for each single cable (1/C), cable pair (2/C) or multiple conductor feeder set, installed in duct bank or conduit with associated ground wire and connections included in Contractor's price. The measurement for this item shall include additional quantities required for slack. No separate measurement will be made to multiply the number of individual conductors installed in a single conduit, in one installation effort.

**108-4.2** Counterpoise wire and connections are considered incidental to the installation of duct bank or conduit, per item L-110. No separate payment will be made.

**108-4.3** Ground rods shall be considered incidental to the installation of counterpoise, light base, transformer housing, sign or other grounding. No separate payment will be made.

## **BASIS OF PAYMENT**

**108-5.1** Payment will be made at the contract unit price for cable and equipment ground installed in duct bank or conduit, in place by the Contractor and accepted by the Engineer. This price shall be full compensation for furnishing all materials and for all preparation and installation of these materials, and for all labor, equipment, tools, and incidentals, including ground rods and ground connectors and trench marking tape, necessary to complete this item.

Payment will be made under:

No. 26, Spec No. L-108-5.1	L-824, Type C, 1/C #8 AWG, 5kV Cable – per Linear Foot
No. 27, Spec No. L-108-5.2	L-824, Type C, 2/C #8 AWG, 5kV Cable – per Linear Foot

## **REFERENCES**

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

### **Advisory Circulars (AC)**

AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-53	Airport Lighting Equipment Certification Program

### **Commercial Item Description**

A-A-59544A	Cable and Wire, Electrical (Power, Fixed Installation)
A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic

### **ASTM International (ASTM)**

ASTM B3	Standard Specification for Soft or Annealed Copper Wire
ASTM B8	Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B33	Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes

ASTM D4388	Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes
Mil Spec	
MIL-PRF-23586F	Performance Specification: Sealing Compound (with Accelerator), Silicone Rubber, Electrical
MIL-I-24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive
National Fire Protection Association (NFPA)	
NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems
American National Standards Institute (ANSI)/Institute of Electrical and Electronics Engineers (IEEE)	
ANSI/IEEE STD 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
Federal Aviation Administration Standard	
FAA STD-019E	Lightning and Surge Protection, Grounding Bonding and Shielding Requirements for Facilities and Electronic Equipment

**END OF ITEM L-108**

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## **ITEM L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS**

### **DESCRIPTION**

**110-1.1** This item shall consist of underground electrical conduits and duct banks (single or multiple conduits encased in concrete or buried in sand) installed per this specification at the locations and per the dimensions, designs, and details shown on the plans. This item shall include furnishing and installing of all underground electrical duct banks and individual and multiple underground conduits. It shall also include all turfing trenching, backfilling, removal, and restoration of any paved or turfed areas; concrete encasement, mandrelling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables per the plans and specifications. This item shall also include furnishing and installing conduits, counterpoise conductor, ground rods and connections including all incidentals for providing positive drainage of the system. Verification of existing ducts is incidental to the pay items provided in this specification.

### **EQUIPMENT AND MATERIALS**

#### **110-2.1 General.**

- a.** All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.
- b.** Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the Engineer and replaced with materials that comply with these specifications, at the Contractor's cost.
- c.** 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 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 made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in project that accrue directly or indirectly from late submissions or resubmissions of submittals.
- d.** 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 Electronic PDF, labeled and tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes specified in this document.



- e. 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.

**110-2.2 Steel Conduit.** Rigid galvanized steel (RGS) conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standards 6, 514B, and 1242. All RGS conduits or RGS elbows installed below grade, in concrete, permanently wet locations or other similar environments shall be painted with a 10-mil thick coat of asphaltum sealer or shall have a factory bonded polyvinyl chloride (PVC) cover. Any exposed galvanizing or steel shall be coated with 10 mil of asphaltum sealer. When using PVC coated RGS conduit, care shall be exercised not to damage the factory PVC coating. Damaged PVC coating shall be repaired per the manufacturer's written instructions.

**110-2.3 Plastic Conduit.** Plastic conduit and fittings shall conform to the following requirements:

- UL 514B covers W-C-1094-Conduit fittings all types, classes 1 thru 3 and 6 thru 10.
- UL 514C covers W-C-1094- all types, Class 5 junction box and cover in plastic (PVC).
- UL 651 covers W-C-1094-Rigid PVC Conduit, types I and II, Class 4.
- UL 651A covers W-C-1094-Rigid PVC Conduit and high-density polyethylene (HDPE) Conduit type III and Class 4.

Underwriters Laboratories Standards UL-651 and Article 352 of the current National Electrical Code shall be one of the following, as shown on the plans:

- a. Type I—Schedule 40 PVC suitable for underground use either direct-buried or encased in concrete.
- b. Type II—Schedule 40 PVC suitable for either above ground or underground use.
- c. Type III – Schedule 80 PVC suitable for either above ground or underground use either direct-buried or encased in concrete.
- d. Type III –HDPE pipe, minimum standard dimensional ratio (SDR) 11, suitable for placement with directional boring under pavement.

The type of solvent cement shall be as recommended by the conduit/fitting manufacturer.

**110-2.4 Split Conduit.** Split conduit shall be pre-manufactured for the intended purpose and shall be made of steel or plastic.

**110-2.5 Conduit Spacers.** Conduit spacers shall be prefabricated interlocking units manufactured for the intended purpose. They shall be of double wall construction made of high grade, high density polyethylene complete with interlocking cap and base pads, they shall be designed to accept No. 4 reinforcing bars installed vertically.

**110-2.6 Concrete.** Concrete shall conform to Item P-610, Structural Portland Cement Concrete, using 1-inch maximum size coarse aggregate with a minimum 28-day compressive strength of 4000 psi. Where reinforced duct banks are specified, reinforcing steel shall conform to ASTM A615 Grade 60. Concrete and reinforcing steel are incidental to the respective pay item of which they are a component part.

**110-2.7 Flowable Backfill.** Flowable material used to back fill conduit and duct bank trenches shall conform to the requirements of Item P-153, Controlled Low Strength Material. Fill shall be designed to achieve a 28-day compressive strength of 200 psi (1.4 MPa) under pavement.

**110-2.8 Detectable Warning Tape.** Plastic, detectable, American Wood Preservers Association (AWPA) Red (electrical power lines, cables, conduit, and lighting cable) with continuous legend magnetic tape shall be polyethylene film with a metallized foil core and shall be 3-6 inches wide. Detectable tape is incidental to the respective bid item.

**110-2.9 Retro-Fit Existing Pavement.** Where conduit is installed under existing asphalt shoulder pavement, Contractor shall saw cut and remove existing section prior to excavation, conduit and counterpoise installation and slurry backfill. Contractor shall repair/replace shoulder pavement in kind. Anticipate 3" of asphalt on 8" of aggregate base. Compaction shall be per P-405, P-201, and P-152 requirements. All saw cut and pavement repair / replacement shall be considered incidental to the associated item being installed (i.e. there is no separate measurement of payment).

## CONSTRUCTION METHODS

**110-3.1 General.** The Contractor shall install underground duct banks and conduits at the approximate locations indicated on the plans. The Engineer shall indicate specific locations as the work progresses, if required to differ from the plans. Duct banks and conduits shall be of the size, material, and type indicated on the plans or specifications. Where no size is indicated on the plans or in the specifications, conduits shall be not less than 2 inches inside diameter or comply with the National Electrical Code based on cable to be installed, whichever is larger. All duct bank and conduit lines shall be laid so as to grade toward access points and duct or conduit ends for drainage. Unless shown otherwise on the plans, grades shall be at least 3 inches per 100 feet. On runs where it is not practicable to maintain the grade all one way, the duct bank and conduit lines shall be graded from the center in both directions toward access points or conduit ends, with a drain into the storm drainage system. Pockets or traps where moisture may accumulate shall be avoided. No duct bank or underground conduit shall be less than 18 inches below finished grade. Where under pavement, the top of the duct bank shall not be less than 18 inches below the subgrade.

The Contractor shall mandrel each individual conduit whether the conduit is direct-buried or part of a duct bank. An iron-shod mandrel, not more than 1/4 inch smaller than the bore of the conduit shall be pulled or pushed through each conduit. The mandrel shall have a leather or rubber gasket slightly larger than the conduit hole.

The Contractor shall swab out all conduits/ducts and clean base can, manhole, pull boxes, etc., interiors IMMEDIATELY prior to pulling cable. Once cleaned and swabbed the light bases, manholes, pull boxes,

etc., and all accessible points of entry to the duct/conduit system shall be kept closed except when installing cables. Cleaning of ducts, base cans, manholes, etc., is incidental to the pay item of the item being cleaned. All raceway systems left open, after initial cleaning, for any reason shall be re-cleaned at the Contractor's expense. All accessible points shall be kept closed when not installing cable. The Contractor shall verify existing ducts proposed for use in this project as clear and open. The Contractor shall notify the Engineer of any blockage in the existing ducts.

For pulling the permanent wiring, each individual conduit, whether the conduit is direct-buried or part of a duct bank, shall be provided with a 200-pound test polypropylene pull rope. The ends shall be secured, and sufficient length shall be left in access points to prevent it from slipping back into the conduit. Where spare conduits are installed, as indicated on the plans, the open ends shall be plugged with removable tapered plugs, designed for this purpose.

All conduits shall be securely fastened in place during construction and shall be plugged to prevent contaminants from entering the conduits. Any conduit section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet.

Unless otherwise shown on the plans, concrete encased duct banks shall be used when crossing under pavements expected to carry aircraft loads, such as runways, taxiways, taxi-lanes, ramps, and aprons. When under paved shoulders and other paved areas, conduit and duct banks shall be encased using flow-able fill for protection.

All conduits within concrete encasement of the duct banks shall terminate with female ends for ease in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for conduits and duct banks may be excavated manually or with mechanical trenching equipment unless in pavement, in which case they shall be excavated with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of graders shall not be used to excavate the trench.

When rock is encountered, the rock shall be removed to a depth of at least 3 inches below the required conduit or duct bank depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4 inch sieve. Flow-able backfill may alternatively be used. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All such rock removal shall be performed and paid for under Item P-152.

Underground electrical warning (Caution) tape shall be installed in the trench above all underground duct banks and conduits in unpaved areas. Contractor shall submit a sample of the proposed warning tape for approval by the Engineer. If not shown on the plans, the warning tape shall be located 6 inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared per the manufacturer's recommendations for the particular type of conduit. Plastic conduit shall be prepared by application of a plastic cleaner and brushing a plastic solvent on the outside of the conduit ends and on the inside of the couplings. The conduit fitting shall then be slipped together with a quick one-quarter turn twist to set the joint tightly. Where more than one conduit is placed in a single trench, or in duct banks, joints in the conduit shall be staggered a minimum of 2 feet.

Changes in direction of runs exceeding 10 degrees, either vertical or horizontal, shall be accomplished using manufactured sweep bends.

Whether or not specifically indicated on the drawings, where the soil encountered at established duct bank grade is an unsuitable material, as determined by the Engineer, the unsuitable material shall be removed per Item P-152 and replaced with suitable material. Alternatively, additional duct bank supports that are adequate and stable shall be installed, as approved by the Engineer.

All excavation shall be unclassified and shall be considered incidental to the respective L-110 pay item of which it is a component part. Dewatering necessary for duct installation, erosion, and turbidity control, per Federal, state, and local requirements is incidental to its respective pay item as a part of Item L-110. The cost of all excavation regardless of type of material encountered shall be included in the unit price bid for the L-110 Item.

Unless otherwise specified, excavated materials that are deemed by the Engineer to be unsuitable for use in backfill or embankments shall be removed and disposed of offsite.

Any excess excavation shall be filled with suitable material approved by the Engineer and compacted per Item P-152.

It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Where existing active cables cross proposed installations, the Contractor shall ensure that these cables are adequately protected. Where crossings are unavoidable, no splices will be allowed in the existing cables, except as specified on the plans. Installation of new cable where such crossings must occur shall proceed as follows:

- a. Existing cables shall be located manually. Unearthed cables shall be inspected to assure absolutely no damage has occurred
- b. Trenching, etc., in cable areas shall then proceed with approval of the Engineer, with care taken to minimize possible damage or disruption of existing cable, including careful backfilling in area of cable.

In the event that any previously identified cable is damaged during the course of construction, the Contractor shall be responsible for the complete repair.

**110-3.2 Duct Banks.** Unless otherwise shown in the plans, duct banks shall be installed so that the top of the concrete envelope is not less than 18 inches below the bottom of the base or stabilized base course layers where installed under runways, taxiways, aprons, or other paved areas, and not less than 18 inches below finished grade where installed in unpaved areas.

Unless otherwise shown on the plans, duct banks under paved areas shall extend at least 3 feet beyond the edges of the pavement or 3 feet beyond any under drains that may be installed alongside the paved area. Trenches for duct banks shall be opened the complete length before concrete is placed so that if any obstructions are encountered, provisions can be made to avoid them. Unless otherwise shown on the plans, all duct banks shall be placed on a layer of concrete not less than 3 inches thick prior to its initial set. The Contractor shall space the conduits not less than 3 inches apart (measured from outside wall to outside wall). All such multiple conduits shall be placed using conduit spacers applicable to the type of conduit. As

the conduit laying progresses, concrete shall be placed around and on top of the conduits not less than 3 inches thick unless otherwise shown on the plans. All conduits shall terminate with female ends for ease of access in current and future use. Install factory plugs in all unused ends. Do not cover the ends or plugs with concrete.

Conduits forming the duct bank shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches to anchor the assembly into the earth prior to placing the concrete encasement. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Engineer for review prior to use.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where shown on the plans. Under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot intervals.

All pavement surfaces that are to have ducts installed therein shall be neatly saw cut to form a vertical face. All excavation shall be included in the contract with price for the duct.

Install a plastic, detectable, color as noted, 3 to 6 inches wide tape, 8 inches minimum below grade above all underground conduit or duct lines not installed under pavement. Utilize the 3-inch wide tape only for single conduit runs. Utilize the 6-inch wide tape for multiple conduits and duct banks. For duct banks equal to or greater than 24 inches in width, utilize more than one tape for sufficient coverage and identification of the duct bank as required.

When existing cables are to be placed in split duct, encased in concrete, the cable shall be carefully located and exposed by hand tools. Prior to being placed in duct, the Engineer shall be notified so that he may inspect the cable and determine that it is in good condition. Where required, split duct shall be installed as shown on the drawings or as required by the Engineer.

**110-3.3 Conduits Without Concrete Encasement.** Trenches for single-conduit lines shall be not less than 6 inches nor more than 12 inches wide. The trench for 2 or more conduits installed at the same level shall be proportionately wider. Trench bottoms for conduits without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the conduit along its entire length.

Unless otherwise shown on the plans, a layer of fine earth material, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the conduit. The bedding material shall consist of soft dirt, sand, or other fine fill, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm. Flow-able backfill may alternatively be used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits within the Airport's secured area where trespassing is prohibited are at least 18 inches below the finished grade. Conduits outside the Airport's secured area shall be installed so that the tops of the conduits are at least 24 inches below the finished grade per National Electric Code (NEC), Table 300.5.

When two or more individual conduits intended to carry conductors of equivalent voltage insulation rating are installed in the same trench without concrete encasement, they shall be spaced not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction. Where two or more individual conduits intended to carry conductors of differing voltage insulation rating are installed in the same trench without concrete encasement, they shall be placed not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

Trenches shall be opened the complete length between normal termination points before conduit is installed so that if any unforeseen obstructions are encountered, proper provisions can be made to avoid them.

Conduits shall be installed using conduit spacers. No. 4 reinforcing bars shall be driven vertically into the soil a minimum of 6 inches to anchor the assembly into the earth while backfilling. For this purpose, the spacers shall be fastened down with locking collars attached to the vertical bars. Spacers shall be installed at 5-foot intervals. Spacers shall be in the proper sizes and configurations to fit the conduits. Locking collars and spacers shall be submitted to the Engineer for review prior to use.

**110-3.4 Markers.** The location of each end and of each change of direction of conduits and duct banks shall be marked by a concrete slab marker 2 feet square and 4 - 6 inches thick extending approximately one inch above the surface. The markers shall also be located directly above the ends of all conduits or duct banks, except where they terminate in a junction/access structure or building. Each cable or duct run from a line of lights and signs to the equipment vault must be marked at approximately every 200 feet along the cable or duct run, with an additional marker at each change of direction of cable or duct run.

The Contractor shall impress the word "DUCT" or "CONDUIT" on each marker slab. Impression of letters shall be done in a manner, approved by the Engineer, for a neat, professional appearance. All letters and words must be neatly stenciled. After placement, all markers shall be given one coat of high-visibility orange paint, as approved by the Engineer. The Contractor shall also impress on the slab the number and size of conduits beneath the marker along with all other necessary information as determined by the Engineer. The letters shall be 4 inches high and 3 inches wide with width of stroke 1/2 inch and 1/4-inch-deep or as large as the available space permits. Furnishing and installation of duct markers is incidental to the respective duct pay item.

**110-3.5 Backfilling for Conduits.** For conduits, 8 inches of sand, soft earth, or other fine fill (loose measurement) shall be placed around the conduits ducts and carefully tamped around and over them with hand tampers. The remaining trench shall then be backfilled and compacted per Item P-152 "Excavation and Embankment" except that material used for back fill shall be select material not larger than 4 inches in diameter.

Flow-able backfill may alternatively be used.

Trenches shall not contain pools of water during back filling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.



Any excess excavated material shall be removed and disposed of per instructions issued by the Engineer.

**110-3.6 Backfilling for Duct Banks.** After the concrete has cured, the remaining trench shall be backfilled and compacted per Item P-152 "Excavation and Embankment" except that the material used for backfill shall be select material not larger than 4 inches in diameter. In addition to the requirements of P-152, where duct banks are installed under pavement, one moisture/density test per lift shall be made for each 250 linear feet of duct bank or one work period's construction, whichever is less.

Flow-able backfill may alternatively be used.

Trenches shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface; except that, where sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of per instructions issued by the Engineer.

**110-3.7 Restoration.** All areas disturbed by the work shall be restored to its original condition. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance. All restoration shall be considered incidental to the respective L-110 pay item. Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD) and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

## METHOD OF MEASUREMENT

**110-4.1** Underground conduits and duct banks shall be measured by the linear feet of conduits and duct banks installed, including encasement, counterpoise conductor, ground rods and connections, locator tape, trenching and backfill with designated material, and for drain lines, the termination at the drainage structure, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

**110-4.2** Retrofit conduits in existing asphalt shoulder pavement shall include saw cutting, slurry backfill and replacement / patch of asphalt pavement in kind.

## BASIS OF PAYMENT

**110-5.1** Payment will be made at the contract unit price per linear foot for each type and size of conduit and duct bank completed and accepted, including trench and backfill with the designated material, and, for drain lines, the termination at the drainage structure. 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 per the provisions and intent of the plans and specifications.

Payment will be made under:

No. 28, Spec No. L-110-5.1      Single-Way 1-2" Conduit Direct Buried – per Linear Foot

No. 29, Spec No. L-110-5.2      Multiple-Way 2-2" Conduit Concrete Encased – per Linear Foot

No. 30, Spec No. L-110-5.3      Multiple-Way 4-2" Conduit Concrete Encased – per Linear Foot

## **MATERIAL REQUIREMENTS**

### Advisory Circular

AC 150/5340-30      Design and Installation Details for Airport Visual Aids

AC 150/5345-53      Airport Lighting Equipment Certification Program

### ASTM International (ASTM)

ASTM A615      Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM D1556      Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

ASTM D1557      Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup>(2,700 kN-m/m<sup>3</sup>))

ASTM D2167      Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

ASTM D2922      Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

NFPA-70      National Electrical Code (NEC)

Underwriters Laboratories Standard 6      Electrical Rigid Metal Conduit - Steel

Underwriters Laboratories Standard 514B      Conduit, Tubing, and Cable Fittings

Underwriters Laboratories Standard 514C      Nonmetallic Outlet Boxes, Flush-Device Boxes, and  
Covers

Underwriters Laboratories Standard 1242      Electrical Intermediate Metal Conduit Steel

Underwriters Laboratories Standard 651      Schedule 40, 80, Type EB and A Rigid PVC Conduit and  
Fittings

Underwriters Laboratories Standard 651A      Type EB and A Rigid PVC Conduit and HDPE Conduit

## **END OF ITEM L-110**



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## ITEM L-115 ELECTRICAL MANHOLES AND JUNCTION STRUCTURES

### DESCRIPTION

**115-1.1** This item shall consist of electrical manholes and junction structures (hand holes, pull boxes, junction cans, etc.) installed per this specification, at the indicated locations and conforming to the lines, grades and dimensions shown on the plans or as required by the Engineer. This item shall include the installation of each electrical manhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, ladders, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the Engineer.

### EQUIPMENT AND MATERIALS

#### 115-2.1 General.

All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Engineer.

Manufacturer's certifications shall not relieve the Contractor of the responsibility to provide materials per these specifications. Materials supplied and/or installed that do not comply with these specifications shall be removed (when directed by the Engineer) and replaced with materials that comply with these specifications at the Contractor's cost.

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 products or models applicable to this project. Indicate all optional equipment and delete any non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment to which they apply on each submittal sheet. Markings shall be made bold and clear with arrows or circles (highlighting is not acceptable). The Contractor is solely responsible for delays in the project that may accrue directly or indirectly from late submissions or resubmissions of submittals.

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 Electronic PDF, labeled and tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures that do not meet the system design and the standards and codes, specified in this document. 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 the date of 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.

**115-2.2 Concrete structures.** Cast-in-place concrete structures are not used.

Provide precast concrete structures where shown on the plans. Precast concrete structures shall be an approved standard design of the manufacturer. Precast units shall have mortar or bitumastic sealer placed between all joints to make them watertight. The structure shall be designed to withstand **100,000** lbs. aircraft loads, unless otherwise shown on the plans. Openings or knockouts shall be provided in the structure as detailed on the plans.

Threaded inserts and pulling eyes shall be cast in as shown.

If the Contractor chooses to propose a different structural design, signed and sealed shop drawings, design calculations, and other information requested by the Engineer shall be submitted by the Contractor to allow for a full evaluation by the Engineer. The Engineer shall review per the process defined in the General Provisions.

**115-2.3 Junction Boxes.** Junction boxes shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) airport light bases that are encased in concrete. The light bases shall have a galvanized steel blank cover, gasket, and stainless steel or coated steel hardware per FAA Engineering Brief (EB) #83. Covers shall be 3/8-inch thickness for L-867 and 3/4-inch thickness for L-868.

**115-2.4 Mortar.** The mortar shall be composed of one part of Portland cement and two parts of mortar sand, by volume. The Portland cement shall be per the requirements in ASTM C150, Type I. The sand shall be per the requirements in ASTM C144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C6. Water shall be potable, reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product.

**115-2.5 Concrete.** All concrete used in structures shall conform to the requirements of Item P-610, Structural Portland Cement Concrete.

**115-2.6 Frames and Covers.** The frames shall conform to one of the following requirements:

- |                       |  |
|-----------------------|--|
| a. ASTM A48           | Gray iron castings                     |
| b. ASTM A47           | Malleable iron castings                |
| c. ASTM A27           | Steel castings                         |
| d. ASTM A283, Grade D | Structural steel for grates and frames |
| e. ASTM A536          | Ductile iron castings                  |
| f. ASTM A897          | Austempered ductile iron castings      |

All castings specified shall withstand a maximum tire pressure of **125** psi and maximum load of **100,000** lbs.

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings specified.

Each frame and cover unit shall be provided with fastening members to prevent it from being dislodged by traffic, but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

Each cover shall have the word “**ELECTRIC**” or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent. No cable notches are required.

Each manhole shall be provided with a “**DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER**” safety warning sign as detailed in the Contract Documents and in accordance with OSHA 1910.146 (c)(2).

**115-2.7 Ladders.** Ladders, if specified, shall be galvanized steel or as shown on the plans.

**115-2.8 Reinforcing Steel.** All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A615, Grade 60.

**115-2.9 Bedding/Special Backfill.** Bedding or special backfill shall be as shown on the plans.

**115-2.10 Flowable Backfill.** Flowable material used to backfill shall conform to the requirements of Item P-153, Controlled Low Strength Material.

**115-2.11 Cable Racks.** Cable Racks shall be of non-conductive plastic. Cable racks shall be located as shown on the plans.

**115-2.12 Plastic Conduit.** Plastic conduit shall comply with Item L-110, Airport Underground Electrical Duct Banks and Conduits.

**115-2.13 Conduit Terminators.** Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

**115-2.14 Pulling-In Irons.** Pulling-in irons shall be manufactured with 7/8-inch diameter hot-dipped galvanized steel or stress-relieved carbon steel roping designed for concrete applications (7 strand, 1/2 inch diameter with an ultimate strength of 270,000 psi (1862 MPa)). Where stress-relieved carbon steel roping is used, a rustproof sleeve shall be installed at the hooking point and all exposed surfaces shall be encapsulated with a polyester coating to prevent corrosion.

**115-2.15 Ground Rods.** Ground rods shall be one piece, copper clad. The ground rods shall be of the length and diameter specified on the plans, but in no case shall they be less than 10 feet long nor less than 3/4 inch in diameter.

## CONSTRUCTION METHODS

**115-3.1 Unclassified excavation.** It is the Contractor's responsibility to locate existing utilities within the work area prior to excavation. Damage to utility lines, through lack of care in excavating, shall be repaired or replaced to the satisfaction of the Engineer without additional expense to the Owner.

The Contractor shall perform excavation for structures and structure footings to the lines and grades or elevations shown on the plans or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown.

All excavation shall be unclassified and shall be considered incidental to the respective L-115 pay item of which it is a component part. Dewatering necessary for L-115 structure installation, erosion and turbidity control, per Federal, state, and local requirements is incidental to its respective pay item as a part of Item L-115. The cost of all excavation regardless of type of material encountered, shall be included in the unit price bid for the L-115 Item.

Boulders, logs and all other objectionable material encountered in excavation shall be removed. All rock and other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped or serrated, as directed by the Engineer. All seams, crevices, disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation. Excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

The Contractor shall provide all bracing, sheeting and shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheeting, and shoring shall be included in the unit price bid for the structure.

Unless otherwise provided, bracing, sheeting and shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb, or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.

After each excavation is completed, the Contractor shall notify the Engineer. Structures shall be placed after the Engineer has approved the depth of the excavation and the suitability of the foundation material.

Prior to installation the Contractor shall provide a minimum of 12 inches of ¾" gravel or a material approved by the Engineer as a suitable base to receive the structure. The base material shall be compacted and graded level and at proper elevation to receive the structure in proper relation to the conduit grade or ground cover requirements, as indicated on the plans.

**115-3.2 Concrete Structures.** Concrete structures shall be built on prepared foundations conforming to the dimensions and form indicated on the plans. The concrete and construction methods shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is placed.

**115-3.3 Precast Unit Installations.** Precast units shall be installed plumb and true. Joints shall be made watertight by use of sealant at each tongue-and-groove joint and at roof of manhole. Excess sealant shall be removed and severe surface projections on exterior of neck shall be removed.

**115-3.4 Placement and Treatment of Castings, Frames and Fittings.** All castings, frames and fittings shall be placed in the positions indicated on the Plans or as directed by the Engineer and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

Field connections shall be made with bolts, unless indicated otherwise. Welding will not be permitted unless shown otherwise on the approved shop drawings and written permission is granted by the casting manufacturer. Erection equipment shall be suitable and safe for the workman. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the proper assembly and fitting of parts shall be reported immediately to the Engineer and approval of the method of correction shall be obtained. Approved corrections shall be made at Contractor's expense.

Anchor bolts and anchors shall be properly located and built into connection work. Bolts and anchors shall be preset by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately.

Pulling-in irons shall be located opposite all conduit entrances into structures to provide a strong, convenient attachment for pulling-in blocks when installing cables. Pulling-in irons shall be set directly into the concrete walls of the structure.

#### **115-3.5 Installation of Ladders.** Not Used.

**115-3.6 Removal of Sheeting and Bracing.** In general, all sheeting and bracing used to support the sides of trenches or other open excavations shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a structure shall be withdrawn, unless otherwise directed, before more than 6 inches of material is placed above the top of the structure and before any bracing is removed. Voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved. The Engineer may order the Contractor to delay the removal of sheeting and bracing if, in his judgment, the installed work has not attained the necessary strength to permit placing of backfill.

**115-3.7 Backfilling.** After a structure has been completed, the area around it shall be backfilled in horizontal layers not to exceed 6 inches in thickness measured after compaction to the density requirements in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer. Backfill shall not be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until tests made by the laboratory under supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it. Where required, the Engineer may direct the Contractor to add, at his own expense, sufficient water during compaction to assure a complete consolidation of the backfill. The Contractor shall be responsible for all damage or injury done to conduits, duct banks, structures, property, or persons due to improper placing or compacting of backfill.

**115-3.8 Connection of Duct Banks.** To relieve stress of joint between concrete-encased duct banks and structure walls, reinforcement rods shall be placed in the structure wall and shall be formed and tied into duct bank reinforcement at the time the duct bank is installed.

**115-3.9 Grounding.** A ground rod shall be installed in the floor of all concrete structures so that the top of rod extends 6 inches above the floor. The ground rod shall be installed within one foot of a corner of the concrete structure. Ground rods shall be installed prior to casting the bottom slab. Where the soil

condition does not permit driving the ground rod into the earth without damage to the ground rod, the Contractor shall drill a 4-inch diameter hole into the earth to receive the ground rod. The hole around the ground rod shall be filled throughout its length, below slab, with Portland cement grout. Ground rods shall be installed in precast bottom slab of structures by drilling a hole through bottom slab and installing the ground rod. Bottom slab penetration shall be sealed watertight with Portland cement grout around the ground rod.

A grounding bus of 4/0 bare stranded copper shall be exothermically bonded to the ground rod and loop the concrete structure walls. The ground bus shall be a minimum of one foot above the floor of the structure and separate from other cables. No. 2 American wire gauge (AWG) bare copper pigtailed shall bond the grounding bus to all cable trays and other metal hardware within the concrete structure. Connections to the grounding bus shall be exothermic. If an exothermic weld is not possible, connections to the grounding bus shall be made by using connectors approved for direct burial in soil or concrete per UL 467. Hardware connections may be mechanical, using a lug designed for that purpose.

**115-3.10 Cleanup and Repair.** After erection of all galvanized items, damaged areas shall be repaired by applying a liquid cold-galvanizing compound per MIL-P-21035. Surfaces shall be prepared, and compound applied per the manufacturer's recommendations.

Prior to acceptance, the entire structure shall be cleaned of all dirt and debris.

**115-3.11 Restoration.** After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. The Contractor shall restore all disturbed areas equivalent to or better than their original condition. All sodding, grading and restoration shall be considered incidental to the respective L-115 pay item.

The Contractor shall grade around structures as required to provide positive drainage away from the structure.

Areas with special surface treatment, such as roads, sidewalks, or other paved areas shall have the backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

Following restoration of all trenching near airport movement surfaces, the Contractor shall thoroughly visually inspect the area for foreign object debris (FOD) and remove any such FOD that is found. This FOD inspection and removal shall be considered incidental to the pay item of which it is a component part.

After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clear and in good condition.

**115-3.12 Inspection.** Prior to final approval, the electrical structures shall be thoroughly inspected for conformance with the plans and this specification. Any indication of defects in materials or workmanship shall be further investigated and corrected. The earth resistance to ground of each ground rod shall not exceed 25 ohms. Each ground rod shall be tested using the fall-of-potential ground impedance test per American National Standards Institute / Institute of Electrical and Electronic Engineers (ANSI/IEEE) Standard 81. This test shall be performed prior to establishing connections to other ground electrodes.



**115-3.13 Manhole Elevation Adjustments.** The Contractor shall adjust the tops of existing manholes in areas designated in the Contract Documents to the new elevations shown. The Contractor shall be responsible for determining the exact height adjustment required to raise the top of each manhole to the new elevations. The existing top elevation of each manhole to be adjusted shall be determined in the field and subtracted/added from the proposed top elevation.

The Contractor shall remove/extend the existing top section or ring and cover on the manhole structure or manhole access. The Contractor shall then install precast concrete sections or grade rings of the required dimensions to adjust the manhole top to the new proposed elevation or shall cut the existing manhole walls to shorten the existing structure, as required by final grades. Finally, the Contractor shall reinstall the manhole top section or ring and cover on top and check the new top elevation.

The Contractor shall construct a concrete slab around the top of adjusted structures located in graded areas that are not to be paved. The concrete slab shall conform to the dimensions shown on the plans.

**115-3.14 Duct Extension to Existing Ducts.** Where existing concrete encased ducts are to be extended, the duct extension shall be concrete encased plastic conduit. The fittings to connect the ducts together shall be standard manufactured connectors designed and approved for the purpose. The duct extensions shall be installed according to the concrete encased duct detail and as shown on the plans.

## METHOD OF MEASUREMENT

**115-4.1** Electrical manholes and junction structures shall be measured by each unit completed in place and accepted. The following additional items are specifically included in each unit:

- All Required Excavation, Dewatering
- Sheeting and Bracing
- All Required Backfilling with On-Site Materials
- Restoration of All Surfaces and Finished Grading, Sodding
- All Required Connections
- Dewatering If Required
- Temporary Cables and Connections
- Ground Rod Testing

## BASIS OF PAYMENT

**115-5.1** The accepted quantity of electrical manholes and junction structures will be paid for at the Contract unit price per each, complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and placing of the materials, furnishing and installation of appurtenances and connections to duct banks and other structures as may be required to complete the item as shown on the plans and for all labor, equipment, tools and incidentals necessary to complete the structure.

**115-5.2** Payment shall be made at the contract unit price for L-867 junction cans. 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, including but not limited to, concrete, rebar, dewatering, excavating, backfill, topsoil, sodding and pavement restoration, where required, to complete this item as shown in the plans and to the satisfaction of the Engineer.

Payment will be made under:

- |                            |  |
|----------------------------|--|
| No. 31, Spec No. L-115-5.1 | New 2'x3'x3' Hand Hole with Aircraft-Rated Lid with Spring Assisted Opening - per Each |
| No. 32, Spec No. L-115-5.2 | Install New Steel Blank Cover on Existing L-867 Base Can with New Bolts - per Each     |

## MATERIAL REQUIREMENTS

ANSI/IEEE STD 81 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

Advisory Circular

(AC) 150/5345-7 Specifications for L-824 Underground Electrical Cable for Airport Lighting Circuits

AC 150/5345-26 Specification for L-823 Plug and Receptacle, Cable Connectors

AC 150/5345-42 Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories

AC 150/5340-30 Design and Installation Details for Airport Visual Aids

AC 150/5345-53 Airport Lighting Equipment Certification Program

Commercial Item Description

A-A 59544 Cable and Wire, Electrical (Power, Fixed Installation)

ASTM A27 Standard Specification for Steel Castings, Carbon, for General Application

ASTM A47 Standard Specification for Ferritic Malleable Iron Castings

ASTM A48 Standard Specification for Gray Iron Castings

ASTM A123 Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products

ASTM A283 Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

ASTM A536 Standard Specification for Ductile Iron Castings

ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A897 Standard Specification for Austempered Ductile Iron Castings

ASTM C144 Standard Specification for Aggregate for Masonry Mortar

ASTM C150 Standard Specification for Portland Cement

ASTM C206 Standard Specification for Finishing Hydrated Lime

FAA EB #83 In Pavement Light Fixture Bolts

MIL-P-21035 Paint High Zinc Dust Content, Galvanizing Repair

NFPA-70 National Electrical Code (NEC)

## END OF ITEM L-115

## **Item L-125 Installation of Airport Lighting Systems**

### **DESCRIPTION**

**125-1.1** This item shall consist of airport lighting systems furnished and installed in accordance with this specification, the referenced specifications, and the applicable advisory circulars (ACs). The systems shall be installed at the locations and in accordance with the dimensions, design, and details shown in the plans. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the RPR.

### **EQUIPMENT AND MATERIALS**

#### **125-2.1 GENERAL.**

Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be certified under the Airport Lighting Equipment Certification Program in accordance with AC 150/5345-53, current version. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not perform as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system for to operate properly.

**a.** Manufacturer's certifications shall not relieve the Contractor of their responsibility to provide materials in accordance with these specifications and acceptable to the RPR. Materials supplied and/or installed that do not comply with these specifications shall be removed, when directed by the RPR and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

**b.** All materials and equipment used shall be submitted to the RPR for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Clearly 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 clearly made with arrows or circles (highlighting is not acceptable). The Contractor shall be responsible for delays in the project accruing directly or indirectly from late submissions or resubmissions of submittals.

**c.** The data submitted shall be sufficient, in the opinion of the RPR, to determine compliance with the plans and specifications. The Contractor's submittals shall be submitted in electronic PDF format, tabbed by specification section. The RPR reserves the right to reject any or all equipment, materials, or procedures, which, in the RPR's opinion, does not meet the system design and the standards and codes, specified herein.

**d.** 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.

e. All LED light fixtures, with the exception of obstruction lighting (AC 150/5345-43) must be warranted by the manufacturer for a minimum of 4 years after date of installation inclusive of all electronics." Obstruction lighting warranty is set by the individual manufacturer.

## EQUIPMENT AND MATERIALS

**125-2.2 Conduit/Duct.** Conduit shall conform to Specification Item L-110 Airport Underground Electrical Duct Banks and Conduits.

**125-2.3 Cable and Counterpoise.** Cable and Counterpoise shall conform to Item L-108 Underground Power Cable for Airports.

**125-2.4 Tape.** Rubber and plastic electrical tapes shall be Scotch Electrical Tape Numbers 23 and 88 respectively, as manufactured by 3M Company or an approved equal.

**125-2.5 Cable Connections.** Cable Connections shall conform to Item L-108 Installation of Underground Cable for Airports.

**125-2.6 Retroreflective Markers.** Retroreflective markers shall be type L-853 and shall conform to the requirements of AC 150/5345-39.

**125-2.7 Runway and Taxiway Lights.** Runway and taxiway lights shall conform to the requirements of AC 150/5345-46. Lamps shall be of size and type indicated, or as required by fixture manufacturer for each lighting fixture required under this contract. Filters shall be of colors conforming to the specification for the light concerned or to the standard referenced.

### LIGHTS

Type	Class	Mode	Style	Option	Base	Filter	Transformer	Notes
L-861T	2 – Base Mounted	1 – 6.6A	N/A	4 – (Mounting Hardware)	L-867 1.5" Threaded Frangible Coupling	Blue (Globes) Glass	30/45W	MITL Taxiway Edge 30W Quartz Halogen 14" Height

**125-2.8 Runway and Taxiway Signs.** Runway and Taxiway Guidance Signs should conform to the requirements of AC 150/5345-44.

**SIGNS**

Type	Size	Style	Class	Mode	Notes
L-858Y L-858L	1	2	2	2	LED Modular Refer to Plans

**125-2.9 Runway End Identifier Light (REIL).** Not Required

**125-2.10 Precision Approach Path Indicator (PAPI).** Not Required

**125-2.11 Circuit Selector Cabinet.** Not Required

**125-2.12 Light Base and Transformer Housings.** Light Base and Transformer Housings should conform to the requirements of AC 150/5345-42. Light bases shall be Type L-867, Class 1A, Size B shall be provided as indicated or as required to accommodate the fixture or device installed thereon. Base plates, cover plates, and adapter plates, extensions and spacers shall be provided to accommodate various sizes of fixtures, and elevation adjustments in accordance with the Plans.

**125-2.13 Isolation Transformers.** Isolation Transformers shall be Type L-830, size as required for each installation. Transformer shall conform to AC 150/5345-47.

**INSTALLATION**

**125-3.1 Installation.** The Contractor shall furnish, install, connect, and test all equipment, accessories, conduit, cables, wires, buses, grounds, and support items necessary to ensure a complete and operable airport lighting system as specified here and shown in the plans.

The equipment installation and mounting shall comply with the requirements of the National Electrical Code and state and local code agencies having jurisdiction.

The Contractor shall install the specified equipment in accordance with the applicable advisory circulars and the details shown on the plans.

**125-3.2 Testing.** All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

**125-3.3 Shipping and Storage.** Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the RPR, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

**125-3.4 Elevated and In-pavement Lights.** Water, debris, and other foreign substances shall be removed prior to installing fixture base and light.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction. The outermost edge of fixture shall be level with the surrounding pavement. Surplus sealant or flexible embedding material shall be removed. The holding device shall remain in place until sealant has reached its initial set.

## METHOD OF MEASUREMENT

**125-4.1** Taxiway lights and isolation transformers will be measured by the number of each type installed as completed units in place, ready for operation, and accepted by the RPR.

Isolation Transformers for guidance signs will be measured by the number of each type and size installed as completed units, in place, ready for operation, and accepted by the RPR.

## BASIS OF PAYMENT

**125-5.1** Payment will be made at the Contract unit price for each complete runway or taxiway light, guidance sign or reflective marker installed by the Contractor and accepted by the RPR. This payment will 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:

No. 33, Spec No. L-125-5.1	New L-861T Quartz Taxiway Edge Light and Isolation Transformer on New L-867 Base Can – Per Each
No. 34, Spec No. L-125-5.2	New L-858 (L) LED Size 2, Style 3, Class 2, 2-Module Airfield Guidance Sign on New Concrete Base – Per Each
No. 35, Spec No. L-125-5.3	New L-858 (L) LED Size 2, Style 3, Class 2, 3-Module Airfield Guidance Sign on New Concrete Base – Per Each
No. 36, Spec No. L-125-5.4	New L-858(L) LED Size 2, Style 3, Class 2, 3-Module Airfield Guidance Sign on Existing Concrete Sign Base - Per Each
No. 37, Spec No. L-125-5.5	New L-858 Size 2, Unlighted Taxiway Ending Marker Sign on New Concrete Sign Base - Per Each

## REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

Advisory Circulars (AC)

AC 150/5340-18

Standards for Airport Sign Systems

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AC 150/5340-26	Maintenance of Airport Visual Aid Facilities
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-44	Specification for Runway and Taxiway Signs
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Specification for Series to Series Isolation Transformers for Airport Lighting Systems
AC 150/5345-51	Specification for Discharge-Type Flashing Light Equipment
AC 150/5345-53	Airport Lighting Equipment Certification Program
	Engineering Brief (EB)
EB No. 67	Light Sources Other than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures

## **END OF ITEM L-125**

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## **Appendix A    Construction Safety Phasing Plan**



# CONSTRUCTION SAFETY & PHASING PLAN

Chandler Municipal Airport  
Taxiway 'B' Improvements Phase 1:  
Taxiway 'L' to Taxiway 'N'

CHD Project No.: AI2302.401  
ADOT Project No.: E3S4C  
Dibble Project No.: 1021015.11

Prepared For: City of Chandler

September 27, 2024



# CONSTRUCTION SAFETY & PHASING PLAN

Chandler Municipal Airport

Taxiway 'B' Improvements Phase 1:

Taxiway 'L' to Taxiway 'N'

CHD Project No.: AI2302.401

ADOT Project No.: E3S4C

Dibble Project No.: 1021015.11

Prepared For:

Chandler Municipal Airport

2380 S Stinson Way

Chandler, AZ 85286

September 27, 2024

Duane Dana, PE

Senior Project Manager

***Dibble***





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# 1. COORDINATION

## 1.1 General Project Information

This project is located at Chandler Municipal Airport (Airport or CHD). The project includes new taxiway and shoulder pavement, pavement markings, grading, lighting and electrical improvements.

This *Construction Safety and Phasing Plan* (CSPP) provides specific information to the Contractor and/or Subcontractors contracted to carry out the construction contract for this project. This plan includes the requirements and procedures for accident prevention, safety requirements, and security considerations at CHD. The Airport's safety objective is to achieve accident-free construction projects. Furthermore, the Contractor must be in full compliance with FAA Advisory Circular (AC) 150/5370-2G: *Operational Safety on Airports During Construction*. The CSPP and project safety and phasing requirements will be discussed in detail at the Pre-Bid and Pre-Construction Conferences. The Contractor is required to submit a *Safety Plan Compliance Document* (SPCD) to CHD describing how the contractor will comply with the requirements set forth in the CSPP.

The Contractor or Subcontractor 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 plan is intended to relieve the Contractor, Subcontractor or suppliers of the obligations assumed by the Contractor under contract with the Airport or as required by law.

Safety must be an integral part of the 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 phasing, marking, barricading, and lighting of airside construction areas is to delineate hazardous areas and prevent unauthorized incursions into the areas by personnel, vehicles, equipment, and aircraft during construction; and to positively separate construction activity from aircraft operations.

A Pre-Bid Conference will be scheduled during the bidding process to allow prospective bidders an opportunity to understand the safety aspects of this project. A key topic of this meeting will include a detailed review of this CSPP, with emphasis on Contractor responsibilities for safety, as well as access and work areas in each phase.

A Pre-Construction Conference will be scheduled prior to the issuance of the Notice to Proceed. Invitees and attendees will include City and Airport staff; the Engineer-of-Record; the RPR; the Contractor's Project Manager/Superintendent; and representatives from the FAA and ADOT (in person or by phone). Relevant safety-related issues will be discussed in detail at this meeting.

Topics of discussion will include the FAA Advisory Circular (AC) 150/5370-2G: *Operational Safety on Airports During Construction*; project scope; the RPR's responsibility; identifying the Contractor's Superintendent; NOTAM responsibility; phasing and scheduling of work; Notice to Proceed date; safety during construction; security, badging and escorting requirements; quality control and testing; test reports; maintenance of record drawings; and other contract and Federal requirements.

The Contractor is required to submit an overall project schedule at the Pre-Construction Conference which will allow Airport staff, the Engineer and the Contractor to identify affected areas during construction.

## 1.2 Contractor Progress Meetings

Weekly construction progress meetings will be held where the invitees and attendees will include at minimum the Airport staff, the RPR, the Contractor's Project Superintendent, and the lead personnel of each Subcontractor. In addition to the discussions on the progress of the project, operational safety procedures identified within the SPCD will be reviewed and discussed.

## 1.3 Scope or Schedule Changes

The Contractor will be required to immediately notify the RPR and Airport Staff of any changes to the original project scope or schedule. The Airport will coordinate (as needed) any changes with the impacted stakeholders, (i.e. tenants, FAA, etc.).

## 1.4 FAA/ATO Coordination

The Airport will be responsible for coordinating as required with the FAA/ATO during construction.

# 2. PHASING

The project will be constructed in five phases, as displayed in **Appendix A – Construction Phasing Plans**. The Contractor is required to provide his own detailed Barricade Plans in accordance with his anticipated operations for the review and approval of the Airport.

**Phase 1.** This will include the construction of approximately 1,100' of Taxiway 'B' outside of the object free areas of both Taxiway 'L' and Taxiway 'N'.

- The construction duration shall be **42 Calendar Days**.
- No taxiway closures are required as all work will occur outside of both connector taxiway TOFAs.

**Phase 2A.** This will include the construction of approximately 100' of Taxiway 'B' within the object free area of Taxiway 'N'.

- The construction duration shall be **21 Calendar Days** concurrent with **Phase 1**.
- Taxiway 'B' and its associated connector taxiways including Taxiway 'N' will be closed.
- Aircraft will access Runway '4R-22L' by crossing the runway on Taxiway 'H' or Taxiway 'L' to taxi down Taxiway 'C'.

**Phase 2B.** This will include the construction of electrical conduit within the Runway '4L-22R' OFZ adjacent to Taxiway 'N'.

- The construction duration shall be **5 Nights** concurrent with **Phase 2A**.
- Work within the ROFZ of Runway '4L-22R' will require nighttime closures of the runway.
- Taxiway 'B' and its associated connector taxiways including Taxiway 'N' will be closed.
- Aircraft will not be permitted to take-off or land at the Airport during the runway closure.

**Phase 3.** This will include the construction of approximately 100' of Taxiway 'B' within the object free area of Taxiway 'L'.

- The construction duration shall be **21 Calendar Days** concurrent with **Phase 1**, but sequential with **Phase 2**.
- Taxiway 'L' and the new Taxiway 'B' extension will be closed.
- Aircraft will access Runway '4R-22L' by crossing the runway on Taxiway 'H' to taxi down Taxiway 'C' or via Taxiway 'N' to taxi down Taxiway 'B'.

**Phase 4.** This will include the placement of temporary pavement markings once all taxiway pavement has been constructed.

- The construction duration shall be **1 Calendar Day** sequential to **Phase 1**.
- Temporary closures of Taxiway 'B', and Connector Taxiways 'L' and 'N' will be required. After application of the markings, all markings shall be protected from damage until dry.
- Aircraft will be directed by the Air Traffic Control Tower (ATCT) in close coordination with Airport Operations.

**Substantial Completion – 43 Calendar Days.** This will mark the completion of all construction in Phases 1 through 4. A pre-final walk-through will be completed by the RPR, Airport Staff, and the Contractor. The Contractor shall be provided with a Substantial Completion letter including a punchlist of any remaining items to complete before Final Completion. The construction warranty will begin from this date.

**Stop Time – 30 Calendar Days.** This will consist of a pavement cure period before permanent marking in Phase 5 below.

**Phase 5 – 1 Calendar Day.** This will consist of permanent marking the entire project area. This will require temporary closures of existing Taxiway 'B', and Connector Taxiways 'L' and 'N' in close coordination with Airport Operations.

**Final Completion – 5 Calendar Days – Total 49 Calendar Days.** This will include the completion of all punchlist items noted on the Substantial Completion letter, final clean-up and demobilization.

### 3. AREAS AND OPERATIONS AFFECTED BY THE CONSTRUCTION ACTIVITY

#### 3.1 Affected Areas on the Airfield

##### 3.1.1 Closed or Partially Closed Facilities

No facilities (buildings or businesses) are anticipated to be closed or partially closed for the duration of this project. For runway and taxiway closures, reference **Section 2 Phasing**.

##### 3.1.2 ARFF Access Routes

Chandler Municipal Airport is not equipped with an ARFF facility, however, this project will have minimal impact on existing emergency access routes. Alternate emergency routes will be coordinated by the airport during the temporary closure of any portion of airfield during the respective construction phases. The Contractor will be directed to maintain the alternate access routes and all other existing routes that may be used by emergency vehicles within the Airfield Operations Area (AOA) at all times.

### 3.1.3 Airport Support Vehicle Access Routes

Chandler Municipal Airport is not an air carrier airport and does not have airport support vehicles.

### 3.1.4 Blast Protection Procedures

The Contractor's company safety plan/guidelines shall include a provision for jet blast protection. At a minimum, it should address requirements for the securing of clothing and hardhats, as well as any requirements for hearing protection.

### 3.1.5 Utilities for Firefighting

No underground utilities used for firefighting (including water) within the AOA are anticipated to be impacted by the construction of this project. While every effort has been made to include the locations and depths of known utilities within the project area, the Contractor will be required to pothole for utilities to avoid damage to them. Fire hydrants are located off-site.

### 3.1.6 Affected Approach and Departure Surfaces

The Contractor will be required to abide by the Part 77 airspace requirements at all times, including all equipment, material and batch plants that may be required for this project. Construction equipment will be limited to stay below the approach surfaces at all times. Equipment along the haul route having a height of 15-ft will be submitted to OE/AAA to be evaluated for Airspace impact.

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 the current edition of FAA AC 150/5300-13A, *Airport Design*, unless a favorable airspace finding has been made by the FAA and the Airport and approved by Airport Operations. Equipment that penetrates the Part 77 imaginary surface must display a red obstruction light during nighttime use and an orange and white checkered flag during the day.

### 3.1.7 Affected Instrument Approach Procedures and NAVAID Critical Areas

No Instrument Approach Procedure or NAVAID Critical Area will be impacted by the project.

## 3.2 Mitigation of Effects

### 3.2.1 Construction Staging Area and Haul Routes

The Contractor's staging and storage area, haul routes, and construction access areas are shown on Construction Plan Sheets **G3.0** through **G3.3**. The Contractor's staging area is located outside of all Object Free Areas. Construction access areas and haul routes have been established to minimize impact to airfield operations. The Contractor will be required to supply gate guards at all construction entrances to the airfield when in use. Gate guards will not be required if the gates are closed and locked.

Transient haul truck drivers are required to check in with the Contractor's security guard. The driver shall be issued an orange/white checkered flag to be mounted on the highest point of the truck; and shall be returned to the security guard upon check out. The driver shall be advised to remain on the marked haul route and follow the appropriate signs to the intended work area. At no time shall any driver be allowed to deviate from the marked haul route. Additionally, during times of low visibility or darkness, the drivers shall be required to use a flashing amber beacon.

### 3.2.2 Temporary Taxi Operations

Temporary taxi operations and alternate routes to accommodate aircraft movement needs are discussed for each project phase in **Section 2 Phasing**.



### 3.2.3 Detours for ARFF and Other Airport Vehicles

The Airport is not equipped with an ARFF facility; however, in the event of an emergency, ARFF and other airport vehicles are not anticipated to be hindered by construction activities related to this project. However, because each construction situation is different, the Contractor must coordinate construction vehicle traffic with the Airport Operations for each phase of construction. Contractor vehicle movements to and from the site must conform to approved Access and Haul Roads or as directed by the Airport at the weekly construction meetings. The Airport will coordinate with all stakeholders any detours from existing Airfield Service Roads as needed, throughout the duration of the project.

### 3.2.4 Maintenance of Essential Utilities

Essential utilities are not anticipated to be impacted in this project. The Contractor will be required to provide temporary means to any impacted utilities until the impacted utilities are restored. Work within the electrical vault will take place during daytime shutdowns of the vault so that all airport lighting can be operable at the end of each shift.

### 3.2.5 Temporary ATC Procedures

The Air Traffic Control Tower (ATCT) will be kept informed of all construction activities throughout the duration of the project. The Contractor will provide construction schedules at least three weeks ahead of the proposed construction activities to be given to the ATCT by the Airport Operations Superintendent. The ATCT will be expected to provide feedback about any concerns that the ATCT has for construction areas and Contractor movements. Project phasing plans will be provided to the ATCT so that they are aware of the impacts to aircraft operations on the ground and in the air.

While the Airport will ultimately be responsible for issuing NOTAMs related to construction activities and restrictions, the ATCT will be responsible for redirecting pilots from proceeding into construction areas.

## 4. PROTECTION OF NAVIGATION AIDS (NAVAIDS)

### 4.1 NAVAID Critical Areas

It is not anticipated that any NAVAID Critical Area will be impacted by this project.

### 4.2 Effects of Construction on NAVAID Performance

The Runway '22R' PAPI's will be completely operational during daytime activities. When work is taking place within the runway OFZ, the contractor shall only work at night between 9:00pm and 6:00am and requiring the closure of the runway. The Airport will be responsible to issue NOTAMs for all air traffic. The Contractor will be required to coordinate any closures a minimum of 48 hours in advance.

### 4.3 Protections of NAVAID Facilities

The Runway '22R' PAPI's, the segmented circle and windcone will be protected in place during construction. All other NAVAIDS for active airfield areas will be maintained and remain operational.

### 4.4 Required Distance from NAVAIDS to Construction Areas

The Runway '22R' PAPI's, the segmented circle and windcone are close to the construction area. The Contractor is to protect these in place during construction. All other NAVAIDS are at a safe distance away from any construction activities as shown on the overall phasing sheet.

## 4.5 Coordination Procedures with FAA/ATO

The Airport staff will be responsible for continually coordinating as required with the FAA/ATO during construction.

## 5. CONTRACTOR ACCESS

### 5.1 General Items

#### 5.1.1 Contractor Access Areas

Any time access is required within restricted areas within the airport, the Contractor shall be responsible for assuring that no breaches of airport security occur. Restricted areas are fenced and must remain fenced at all times. The gates will remain closed and locked, or a guard (badged by the airport) will be provided at the Contractor's expense. The Contractor will furnish the guard with a roster of his personnel and will ensure that each individual has adequate identification. The duplicate keys for each lock will be turned over to Airport authorities. The following additional measures must also be taken:

- No person shall enter the Contractor's worksite without authorization. Any person found within the worksite without proper identification as described herein shall be considered unauthorized and shall be removed from the worksite.
- Contractor Superintendents and Supervisors will be required to wear identifiable equipment or clothing to be easily recognized and located on site.
- Reference Section 3.2.1 – *Construction Staging Area and Haul Routes* for additional requirements imposed on the Contractor regarding the Staging Area and Haul Routes.

#### 5.1.2 49 CFR Part 1542, Airport Security

The airport is operated in strict compliance with Federal Aviation Regulations (FAR), which prohibit unauthorized persons or vehicles in the Air Operations Area (AOA). Equipment and workmen will be restricted to the work area defined on the plans. Any violation by Contractor's personnel or Subcontractors will subject the Contractor to penalties imposed by the FAA or the Airport.

The Contractor will assume all fines assessed to them by the Airport and all fines against the Airport assessed to them by the FAA/ for the Contractor's security violations. Typical FAA fines are ten thousand dollars (\$10,000.00) or more per incident.

The Contractor shall be responsible for the protection of the construction site, and all work, materials, equipment, and existing facilities thereon, against vandals and other unauthorized persons. Security measures shall include additional security fencing, barricades, lighting, and other measures as the Contractor may deem necessary to protect the site.

The Contractor's responsibilities for work areas are as follows:

- The Contractor shall be held responsible for controlling his employees, Subcontractors, and their employees with regard to traffic movement.
- The Contractor shall rebuild, repair, restore, and make good at his own expense all injuries or damages to any portion of the work occasioned by his use of these facilities before completion and acceptance of his work.
- The Contractor shall submit to the RPR in writing a detailed work plan for each construction phase. This plan shall be submitted 14 calendar days prior to the start of each construction phase. No work within the construction phase may commence until the phase work plan is approved.

- The Contractor shall submit to the RPR in writing a plan, by construction phase, for controlling construction equipment and vehicular movements in the Air Operations Area (AOA). This plan shall be submitted at the Pre-Construction Meeting. No work may commence until this plan is approved by the Airport. The plan must include material haul roads.
- The Contractor shall provide a responsible Traffic Manager whose duty shall be to direct all construction traffic on or near active runways, taxiways, haul roads and highways. Paved surfaces shall be kept clear at all times and specifically must be kept free from all debris which might damage aircraft.

The project does not require the distribution of security badges to Contractor, Subcontractor, or material supplier employees.

No weapons will be allowed on the airport by any Contractor personnel at any time.

## 5.2 Location of Stockpiled Construction Materials

All contractor materials, equipment and supplies shall be within the Contractor's designated staging and storage area. All storage areas shall be marked; debris boxes covered and area kept neat and clean of debris.

For equipment that must remain in the work area, the following conditions must be met:

- Be located outside of the runway/taxiway safety and object free areas.
- Be marked with lighted barricades around the equipment perimeter with a spacing of no more than 10 feet.
- Be coordinated at least 48 hours in advance with the RPR.
- The highest point of the equipment marked and lit with a red flashing/steady burning omnidirectional obstruction light.

Stockpiled materials are allowed only within the Contractor's designated staging and storage area.

- Remove daily all stockpiled material from within aircraft movement areas, unless otherwise directed by the RPR.
- No excavated or stored materials may remain within active runway or taxiway safety areas and object free zones.
- Stockpiled material may be located within the Air Operations Area only upon prior coordination and approval of the RPR.

## 5.3 Vehicle & Pedestrian Operations

### 5.3.1 Construction Site Parking

Construction parking will be allowed in the Contractor's Staging and Storage Area, which is outside of any Object Free Areas. No personal vehicles will be allowed onto the airfield with the exception of inside the Contractor's Staging and Storage Area. See **Section 5.1.1 – Contractor Access Areas** for further information.

### 5.3.2 Construction Equipment Parking

Construction equipment parking will be in the Contractor's Staging and Storage Area for any equipment that is not in use.

### 5.3.3 Access and Haul Roads

Access and haul roads on Airport property will be delineated with the use of low-profile barricades, flagging, temporary construction fencing, escorts, or a combination thereof. Contractor access and haul roads will be verified by the Airport at the time of construction. Only under special circumstances, may the Contractor request special approval from the Airport and RPR to leave equipment outside the staging and storage area. See **Section 5.1.1 – Contractor Access Areas** for further information.

### 5.3.4 Marking and Lighting of Construction Vehicles

All Contractor and Subcontractor vehicles must be properly marked with the company name at least four (4) inches in height on both sides of the vehicle. All vehicles must have a 3' x 3' orange and white checkered flag at the tallest point on the vehicle for daytime construction activities, and a flashing amber or yellow beacon, mounted at the highest point for nighttime construction.

All vehicle marking and lighting must comply with the most recent version of FAA AC 150/5210-5D, *Painting, Marking and Lighting of Vehicles Used on an Airport*.

### 5.3.5 Construction Vehicle Operations Within AOA

For the purposes of this project, the AOA is defined as any area within the secured (fenced) area of the Airport. No vehicle shall operate within the Air Operations Area (AOA):

- In a careless or negligent manner.
- With disregard of the rights and safety of others.
- At a speed (15 MPH maximum) or in a way which endangers persons or property.
- While the driver is under the influence of drugs or alcohol.
- If such vehicle is loaded or maintained as to endanger persons or property.
- Without constant observance for operating aircraft.

## 5.4 Two-Way Radio Communications Procedures

If needed, the Contractor shall be responsible for obtaining and maintaining ICOM IC-A24/A6 VHF Air Band Transceiver radios, or approved equal, for his crews for use during construction and will not be permitted to borrow radios from the airport for use during construction. At a minimum, the Contractor shall provide radios for the Project Superintendent, all personnel required to control construction traffic across active runways, taxiways, and parking aprons, and operators on controlled surfaces, (i.e. sweeper operators, escort vehicles, or others who have need to operate/transit outside of the restricted construction areas). All costs associated with acquiring and maintaining the approved radios shall be considered incidental to SP-60.05.1 *Airfield Safety and Security* bid item and no separate payments will be made.

## 5.5 Airport Security

Any time access is required within the Airport Operations Areas (AOA) the Contractor shall be responsible for assuring that no breaches of airport security occur. The AOA is fenced and must remain fenced at all times. The gates will remain closed and locked or a guard (with an airport issued access card) will be provided at the Contractor's expense. The Contractor will furnish gate guards with rosters of his personnel and ensure that each individual has adequate identification. The duplicate keys for each lock will be turned over to Airport authorities. The following additional measure must also be taken:

- Persons authorized to provide escorts include Airport staff and designated contractor supervisors. Failure to provide an escort can result in loss of escort privileges, fines, revocation of the access card, or all three.

Reference **Section 3.2.1 Construction Staging Area and Haul Routes** for additional requirements imposed on the Contractor regarding the Staging Area and Haul Routes.

## **6. WILDLIFE MANAGEMENT**

### **6.1 Trash**

The Contractor shall perform daily inspections of the work areas (including the Contractor's staging area) to remove any trash, debris and food scraps and place these items in an appropriate trash receptacle. Trash receptacles, regardless of type and size, must always be covered and secured to eliminate the possibility of contents from escaping.

### **6.2 Standing Water**

The Contractor shall conduct his/her operations to minimize the potential for standing water. When water begins to stand on site, the Contractor shall begin pumping water to drain the area within 24 hours to prevent the attraction of wildlife.

### **6.3 Tall Grass & Weeds**

The Contractor shall mow areas under his/her responsibility including, but not limited to, project site staging and storage areas and exclusive use haul roads to prevent the growth of vegetation over 6-inches.

### **6.4 Poorly Maintained Fencing and Gates**

The Contractor shall close and lock any airfield access gates that are not in use. Any fencing installed by the Contractor shall be maintained to prevent the intrusion of wildlife.

### **6.5 Disruption of Existing Wildlife Habitat**

The Contractor shall report any significant wildlife sightings within the AOA to the nearest Airport employee.

### **6.6 Airport Wildlife Management Procedures**

The Contractor will be required to follow any Airport Wildlife Management Procedures that are in place at the airport; however, at a minimum the Contractor will be required to perform the following:

- Close and lock any airfield access gates that are not in use.
- Report any significant wildlife sightings within the AOA to the nearest Airport employee.

## **7. FOREIGN OBJECT DEBRIS (FOD) MANAGEMENT**

This project will include the movement of construction vehicles adjacent to active airfield pavements, therefore the Contractor will be required to maintain a fully operational sweeper vehicle on-site during the project. Furthermore, once any portion of any construction is ready to be opened to aircraft traffic, the Contractor, RPR, and Airport personnel shall walk the area to determine that all FOD that may have been generated is no longer present.

The Contractor will be required to keep water on construction areas to minimize the possibility of FOD generated by wind. The Contractor will be required to conduct FOD checks at the end of each working shift/day to remove any FOD that has made its way onto the airfield pavements from the Contractor's construction activities. Airport Operations and Construction Administration personnel will be present for these FOD checks to ensure compliance.

## 8. HAZARDOUS MATERIAL MANAGEMENT

Any hazardous or regulated waste material produced by the Contractor's operations shall be properly disposed of at the Contractor's expense pursuant to all local, state, and federal regulations. The Contractor may be required to provide test results to confirm that a contaminated area has been properly remediated.

Any hazardous materials situation that poses a threat to safety or property shall be immediately reported to emergency personnel by dialing '911' and to the nearest Airport employee.

## 9. NOTIFICATIONS OF CONSTRUCTION ACTIVITIES

### 9.1 Points of Contact

A full list of Points of Contact and Contact Procedures will be developed prior to the Pre-Construction Meeting for this project. Under normal circumstances, all communications concerning the construction project between airport stakeholders and the contractor shall be channeled through the RPR who shall be the primary point of contact for all communications concerning the construction project. Matters relating to Airport operations will be handled through the Airport, with assistance from the RPR and/or Contractor as needed.

Contact	Phone Number	Availability
TBD Resident Project Representative, Dibble	---	Construction Hours
Duane Dana, P.E. Engineer-of-Record, Dibble	480-365-9056	Mon-Fri, 8:00am to 5:00pm
Office Mainline CHD Operations	480-782-3540	(Mon-Fri, 8:00 am to 5:00 pm)
Scott Rinkenberger Airport Operations Administrator	480-782-3546	(24 Hours/Day, 7 Days/Week)

### 9.2 Local ATO/Technical Operations Personnel

The Airport will be responsible for all communications with the local ATO/Technical Operations.

### 9.3 ATCT Managers on Duty

The Airport will acquire a list of the ATCT Managers on duty for the project prior to construction commencing. This list will be available for use by Airport staff by the date of the Pre-Construction Meeting. This will also be a regular item discussed at the weekly construction meetings.

#### **9.4 Authorized Representatives to the FAA's Operational Control Center (OCC)**

The Airport will develop a list of authorized representatives to the OCC prior to construction commencing. This list will be provided to the OCC by the date of the Pre-Construction Meeting.

#### **9.5 OCC Notification About Closed and/or Hazardous Conditions on the Airfield**

The Airport staff will be responsible for notifying the OCC about closed facilities and/or hazardous conditions at the Airport. The OCC will be notified about closed facilities as soon as practicable following reliable scheduling meetings. Unanticipated hazardous conditions will be immediately relayed to the OCC by Airport staff.

#### **9.6 Notice to Air Missions (NOTAM)**

Construction NOTAM's will be filed by the Airport staff approximately three (3) days prior to construction beginning in the area which the NOTAM references, or prior to any change in airfield conditions which may affect operations or safety. The Contractor will be required to submit pertinent information to the airport for any construction items that would require the issuance of a NOTAM a minimum of 2 weeks prior to the work being performed.

#### **9.7 Emergency Notification Procedures**

For any medical and law enforcement emergencies call '911'. Following a call to '911', the Contractor shall then call Chandler Municipal Airport Operations at 480-540-9991.

The Contractor shall submit to the RPR and Airport a list of personnel who can be contacted 24 hours a day, seven (7) days a week and can respond in a reasonable time frame regarding any possible emergency on the work site. The list must include names, job title and phone numbers.

#### **9.8 Coordination with ARFF for Non-Emergency Issues**

The Airport does not have an ARFF facility. The Contractor shall contact the Airport Manager concerning non-emergency issues of the following:

- The deactivation and subsequent reactivation of water lines and fire hydrant.
- The establishment, re-routing, or blocking of emergency routes.
- The use of hazardous materials on the airfield.

#### **9.9 Notification to the FAA and Airport Users**

This project is phased in order to maintain an operating airfield; therefore each phase will likely require additional information to be passed on to the Airport Users as the project progresses. NOTAMs and project advisories will be distributed approximately three (3) days prior to a new construction phase which may affect normal operating conditions at the Airport. Anticipated night work by the Contractor will need the Airport approval prior to proceeding with the night work.



## **9.10 FAA Notification Under CFR Parts 77 and 157**

All proposed construction activities that affect operations at the Airport will be immediately relayed to all Airport Users and the FAA by way of meetings, advisories, NOTAM's, and the filing of Form 7460 as appropriate (minimum of 60 days prior to the proposed construction) all issued by one of the Airport's designated staff or RPR.

## **9.11 FAA Reimbursable Agreements**

A FAA Reimbursable Agreement is not a method of funding for this project.

## **9.12 Affected Instrument Approach Procedures**

No Instrument approach procedure is affected by this project.

# **10. INSPECTION REQUIREMENTS**

## **10.1 Daily (or more frequent) Inspections**

Daily inspections will be required for areas requiring haul routes on active airfield pavements to ensure that FOD is minimized. In addition, daily inspections of Contractor access areas will be performed to help ensure safety on the airfield. Daily inspections will be conducted by an Airport Operations employee, a Contractor representative, and the RPR.

Special inspections will be required for airfield pavements that are ready to be re-opened to aircraft traffic after completion of the project. Special inspections will also be attended by an Airport Operations employee, a Contractor representative, and the RPR.

All discrepancies noted in the inspection must be corrected to the satisfaction of the RPR prior to the Contractor leaving the worksite.

Should any inspection reveal any FOD concerns, the Contractor shall have a crew ready to remove any FOD prior to reopening the pavements. Should any inspection reveal work that does not meet Contract requirements or that is deficient in any way, the Contractor shall mobilize a crew as soon as possible to remedy the deficient areas to avoid prolonging the continued closure of the areas.

## **10.2 Final Inspections**

Inspections will be required at the Substantial Completion and Final Completion phase of the project. These inspections will be attended by the Contractor, Airport Manager, FAA, ADOT Aeronautics, the RPR, and Construction Administration representatives. A punch list will be developed at the Substantial Completion inspection, and any items placed on the punch list will be required to be completed within 30 days. Final Inspection will be scheduled 30 days after the substantial completion walkthrough.

Should any inspection reveal any FOD concerns, the Contractor shall have a crew ready to remove any FOD prior to reopening the pavements. Should any inspection reveal work that does not meet Contract requirements or that is deficient in any way, the Contractor shall mobilize a crew as soon as possible to remedy the deficient areas to avoid prolonging the continued closure of the areas.



### 10.3 Inspection Checklist

The Airport Manager, Operations Manager, the Engineer/Construction Manager/RPR, and the Contractor will utilize **Appendix B – Inspection Checklist** for evaluating the Contractor's adherence to the contract documents and this CSPP, as well as for reopening any areas to aircraft traffic.

## 11. UNDERGROUND UTILITIES

Prior to beginning construction on the airfield, the Contractor will be required to Blue Stake and pothole (if necessary) existing utilities in the project areas. Protection of utilities may include, but is not limited to, flagging utilities, marking lines on pavement, and placement of barricades along utility lines and at manholes. General Technical Provisions provide the Contractor with detailed direction for the location of underground utilities.

## 12. PENALTIES

The Contractor will be required to enforce his company's safety policies with the employees working on this project. In addition, the Airport may enforce policies that are in place to protect the safety of the Airport property, its users, and the local Airspace. These policies include, but are not limited to, the following:

- Informal conversations with the subject person or party
- Formal meetings/conversations with the subject person or party and their supervisors/managers
- Formal written notices of non-compliance from the Airport
- Immediate removal from Airport property
- Notification of law enforcement personnel for persons that cause situations posing dangerous threats to property or personal safety.

Reference Special Provisions for additional requirements imposed on the Contractor regarding Airport Safety and Security.

## 13. SPECIAL CONDITIONS

Special unforeseen conditions or circumstances may require the activation of special procedures by the Airport. In cases involving aircraft emergencies or distressed aircraft the Contractor may be required to temporarily halt construction activities and immediately vacate the area in which he is working. The nearest Airport Operations employee will be expected to notify all Contractor personnel in the vicinity and promote safe and orderly removal of all Contractor personnel and equipment to an area that is no longer in conflict with the emergency at hand. The Contractor will be expected to immediately comply with all Airport personnel directions and may not return to the subject work area until given the permission to do so.

In the event of low-visibility conditions, or other conditions which may signal the need for additional unimpeded space next to runways or taxiways, the Contractor may be required to move to another work area of the project or temporarily stop work. The Contractor will be made aware of the possibility of these situations during the Pre-Construction Conference.

## 14. RUNWAY & TAXIWAY VISUAL AIDS

### 14.1 General

Temporary visual aids may be used from time to time as the project progresses to increase safety. Any temporary visual aid will be secured either in-pavement or with heavy items preventing blow-away (against jet-blast, prop wash or a 90-mph wind), while at the same time not obscuring the objects themselves.

All temporary visual aids must have frangible connections. Connections shall be submitted for approval by the RPR.

### 14.2 Markings

Any markings that may be required for this project will meet the requirements of FAA Advisory Circular 150/5340-1M, *Standards for Airport Markings*.

### 14.3 Lighting and Visual Aids

Lighting and signs for all barricades used within the AOA shall be red and shall be a steady-burn or blinking light. All barricading and lighting shall conform to the details in the plans and specifications. Low-profile barricades shall be placed end-to-end to prevent ground vehicle traffic from moving onto active airfield pavements (barring a deliberate act), and alert aircraft traffic of closed facilities.

**Appendix A** – *Construction Phasing Plans* show the placement of all barricades and their locations.

Lighting for any closed facilities will be disconnected or covered and secured with a material that prevents light leakage. Disconnected lighting shall be completed so as to not affect the remaining portion of facilities that may be open to aircraft traffic.

Lighting shall 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*, AC 150/5345-53: *Airport Lighting Certification Program*, 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*, as required.

### 14.4 Signs

Airfield signage illuminated to indicate an open facility that is closed due to construction shall be covered and secured with a material that prevents light leakage. Signs may be partially covered as several signs have multiple panels. In this case, only the affected panels shall be covered.

## 15. MARKING & SIGNS FOR ACCESS ROUTES

Temporary signing used for Contractor access/haul routes, open trenching or other hazards shall be clear, concise, reflective, and large enough to minimize safety-related issues. All temporary signing shall meet the requirements of AC 150/5340-18G: *Standards for Airport Sign Systems* and, to the extent practicable, with the *Manual of Uniform Traffic Control Devices* (MUTCD) and/or State highway specifications. All temporary signs shall also be properly weighted and/or secured to withstand site and elemental conditions.

## 16. HAZARD MARKING & LIGHTING

### 16.1 General

Hazards, such as open trenches, manholes, and steep embankments shall be barricaded and lighted with pennant flagging or orange fabric construction fencing to prohibit accidental falls. The Contractor's site-specific and company safety plan/guidelines shall address the protection of these areas and the protection of the employees against these hazards. The Contractor shall also assign a Project Safety Officer for the project to monitor and enforce the Contractor's safety guidelines and the provisions of this CSPP.

When areas on the Airport are closed or present hazards due to construction activities, they should be marked and lighted according to AC 150/5340-1M, *Standards for Airport Markings*. Marking and lighting must be approved by Airport Operations.

#### 16.1.1 Less Obvious Construction Related Hazards

Some less obvious construction related hazards include, but are not limited to, the following:

- Loose debris, trash, etc. in the work areas
- Loose debris, trash, etc. on or in the bed of vehicles
- Jet blast/Prop blast
- Aircraft engine run-up noise

The Contractor shall be vigilant in keeping the work areas in a safe and trash-free condition as much as possible so as to prevent debris from making its way onto active airfield pavements. The Contractor shall also exercise due care when working the vicinity of active aircraft. This can include the use of hearing protection and the securing of clothing and hardhats while working.

### 16.2 Barricades

#### 16.2.1 Placement

Construction areas will be barricaded with either vertical panel or low-profile barricades on aircraft movement areas. For construction areas that do not include aircraft operating areas, vertical panel barricades may be used to prohibit vehicle and pedestrian traffic. All barricades must have flashing red or steady burn lights.

Barricades, temporary markers approved by the Airport, and any other warning equipment placed or left in areas adjacent to any open aircraft movement area, (i.e. runway, taxiway, taxilane, etc.), shall be as low to the ground as possible, and not more than 18 inches in height, (unless otherwise noted on the phasing plans). All barricades and temporary markers shall also be properly secured to withstand the site and elemental conditions. All barricading requirements regarding type, spacing, etc. were provided in the plans and are further identified in the Contract Documents. Low-profile barricades shall be used and shall be reflective, have an omni-directional steady-burning or flashing red LED light, and shall be properly secured (screwed-in). Clamps or straps will not be allowed.

Low-profile barricades shall be placed end-to-end to prevent ground vehicle traffic from moving onto active airfield pavements (barring a deliberate act), and alert aircraft traffic of closed facilities.

### 16.2.2 Lights

Red LED lights on low-profile barricades shall be of the omni-directional, flashing or steady-burn type. The rate of flash and illumination, as well as barricade reflectivity, shall meet the requirements of the latest edition of the MUTCD. Additional lighting shall be provided if determined necessary by Airport Operations.

### 16.2.3 Supplement Barricades with Signs

Signage shall be installed when determined necessary by Airport Operations, i.e. “No Entry”.

### 16.2.4 Maintenance

The Contractor shall designate an employee (or Subcontractor) to be responsible for the regular maintenance of barricades and lighting. In addition, the Contractor shall provide an emergency contact number for the responsible individual to perform any emergency maintenance on any barricades or lighting and ensure functional operation of all hazard lighting and barricades 24 hours per day, 7 days per week. The designated person or subcontractor shall be able to respond to the Airport within one (1) hour of notification of a non-functioning barricade.

Barricading and lighting equipment shall be secured to prevent blow-down. This may include the use of water-filled items, sandbags, and/or flat heavy footings. Temporary lighting may be secured to the pavement with nails or screws.

## 16.3 Work Zone Lighting for Nighttime Construction

Lighting equipment must adequately illuminate the work area for construction performed during nighttime hours following minimum illumination levels per AC 150/5370-10H, *Standard Specifications for Construction of Airports*.

## 17. PROTECTION OF RSA'S, TSA'S, OFA'S, OFZ'S, AND APPROACH/DEPARTURE SURFACES

### 17.1 Runway Safety Area (RSA)

The project includes work within the Runway ‘4L-22R’ Safety Area, requiring the closure of the runway which may only occur at night. The RSA is 150 feet wide, centered on the runway centerline. Closure of the runway requires two (2) lighted X’s, which shall be provided by the Airport, but shall be maintained and operated by the Contractor. There are measures that include strict coordination with the Airport, ATCT, and the RPR. Contractor requests to perform work within a Runway Safety Area will require at least 48-hour notice to the Airport. The Airport will be responsible for the issuance of all NOTAMs.

#### 17.1.1 Requirements for Open Procedures

Prior to a runway being reopened, the Contractor will be required to:

- Ensure that all new aircraft pavement (runways, taxiways, etc.) is completed in place (i.e., the existing pavement milled/removed at night must be repaved the same night for aircraft traversal the next morning).
- Provide a sweeper truck and/or vacuum truck and clean runway and taxiway pavements in the vicinity of the work areas.
- Straighten up the graded/infield areas such that there are no humps, ruts, depressions, equipment, tools, or other materials within the RSA.

- Perform a FOD/safety walk of the runway pavement and the adjacent graded/infield areas with Airport staff to ensure compliance with the reopening inspection.
- Perform any additional necessary actions as a result of the FOD/safety walk as required by the construction inspection and/or Airport staff.
- Remove the low-profile barricades used for night closures.
- Remove the lighted X's from the runway designation markings.

#### 17.1.2 Appropriate Covering of Excavations Within RSA's

Prior to re-opening the runway, all excavations within the RSA and ROFZ shall be filled and compacted. The Contractor's site-specific and company safety plans/guidelines shall address the protection of these areas and the protection of the employees against these hazards.

#### 17.1.3 Marking of Excavations and Open Trenches

Hazards, such as open trenches, major excavations, manholes, and steep embankments shall be barricaded, lighted, and outlined with appropriate caution tape or orange fabric construction fencing to prohibit accidental falls. The Contractor's site-specific and company safety plan/guidelines shall address the protection of these areas and the protection of the employees against these hazards. See **Section 16 – Hazard Marking & Lighting** for further information.

#### 17.1.4 Maintenance of RSA's

The Contractor will be required to maintain the RSA while work is being performed in the area. Upon completion of work within the RSA, the Contractor will be required to leave the area in accordance with RSA standards, or as identified in the plans.

### 17.2 Obstacle Free Zone (OFZ)

This project includes electrical work within the Runway '4L-22R' OFZ, which is 250 feet wide, centered on the runway centerline. When work is taking place within the runway OFZ, the contractor shall only work at night between 9pm to 6am and shall be in close coordination with Airport Operations. See **Section 17.1 Runway Safety Area (RSA)** for further information.

### 17.3 Runway Object Free Area (ROFA)

No equipment or tools will be left unattended within the ROFA as the Contractor will be required to move these items to the Staging and Storage Area when not in use.

### 17.4 Taxiway Safety Area (TSA)

Multiple taxiways will be affected as part of this project, and as such, any taxiway having construction within its Safety Area and Object Free Area will be closed during construction duration/hours. No equipment or tools will be left unattended within the TOFA as the Contractor will be required to move these items to the staging and storage area when not in use.

#### 17.4.1 Requirements for Open Procedures

Prior to any taxiway being reopened, the Contractor will be required to:

- Provide a sweeper truck and/or vacuum truck and clean the taxiway pavement in the vicinity of the work areas;

- Temporarily safe-up the graded/infield areas such that there are no humps, ruts, depressions, equipment, tools, or other materials within the TSA;
- Ensure that any excavation within the TSA is filled and compacted;
- Perform a FOD/safety walk of the taxiway pavement and the adjacent graded/infield areas with construction inspection and Airport staff to ensure compliance with these procedures;
- Remove the low-profile barricades from the applicable taxiways;
- Perform any additional necessary actions as a result of the FOD/safety walk as required by the construction inspection and/or Airport staff.
- Remove any barricades used for the temporary nightly closure.

#### 17.4.2 Appropriate Covering of Excavations Within TSA's

Any excavation within any TSA shall be filled and compacted prior to reopening a taxiway.

#### 17.4.3 Marking of Excavations and Open Trenches

Hazards, such as open trenches, major excavations, manholes, and steep embankments shall be barricaded, lighted, and outlined with appropriate caution tape or orange fabric construction fencing to prohibit accidental falls. The Contractor's site-specific and company safety plan/guidelines shall address the protection of these areas and the protection of the employees against these hazards. See **Section 16 Hazard Marking & Lighting** for further information.

#### 17.4.4 Maintenance of TSA's

The Contractor will be required to maintain the TSA while work is being performed in the area. Upon completion of work within the TSA, the Contractor will be required to leave the area in accordance with TSA standards, or as identified in the plans.

### 17.5 Taxiway Object Free Area (TOFA)

Multiple taxiways will be affected as part of this project, and as such, any taxiway having construction within its Object Free Area will be closed during construction duration/hours. No equipment or tools will be left unattended within the TOFA as the Contractor will be required to move these items to the staging and storage area when not in use. See **Section 17.4 Taxiway Safety Area (TSA)** for further information.

### 17.6 Runway Approach & Departure Surfaces

It is not anticipated that any construction of this project will impact a Runway Approach or Departure Surface or Clearway.

## 18. OTHER LIMITATIONS ON CONSTRUCTION

### 18.1 Prohibitions

#### 18.1.1 Use of Flare Pots

The use of flare pots is not permitted within the AOA at any time.

#### 18.1.2 Use of Electrical Blasting Caps

The use of electrical blasting caps is not permitted within 1,000-ft of the Airport property.

## 18.2 Restrictions

### 18.2.1 Tall Equipment

The use of tall equipment is not permitted unless a 7460-1 determination letter is issued.

### 18.2.2 Open Flame Welding and Torches

Open flame welding and the use of torches shall be approved by the Airport prior to the project commencing. If this type of work is required on this project, the Contractor shall notify the Airport at least 48 hours in advance of the work.

### 18.2.3 Airfield Lighting Vault Lock-Out/Tag-Out Policy

This project includes installing new taxiway edge lighting in multiple areas of the project, and the contractor shall be responsible for scheduling and coordinating this work with the Airport so that the appropriate lock-out/tag-out procedures are strictly adhered to.

Prior to opening any electrical pull box or light cans, the appropriate circuits will be tagged and locked out at the vault room in accordance with OSHA requirements. A pre-event meeting shall be held on site at least 48 hours in advance of the work with the Contractor, the Airport, and the RPR to review the work undertaken, to familiarize all parties with the existing system and controls that will shut down and re-started, and to confirm lock-out/tag-out procedures used. The Contractor shall provide multi-position hasp and both the Contractor and the Airport will attach their own separate locks. No system shall be energized until such time that both parties have removed their locks, indicating a safe situation to energize. The system will be checked for functionality by the Contractor in the presence of a CHD staff member before leaving the project site.

The purpose of this procedure is to standardize the lock-out/tag-out procedures between Electrical Contractors, Airport Electricians, Operations, and the Air Traffic Control Tower. This procedural checklist must be followed to the letter:

- The Airport electricians responding to a lock-out/tag-out request will coordinate with the ATCT through Operations.
- After Operations notifies electricians of closures, the Airport electricians will turn off the closed runways/taxiways using the airfield computer system.
- The Contractor will supply an approved breaker-locking device and lock, then lock off the individual breakers for the circuits to be locked out. These items will remain in the vault in a lock box provided by Airport.
- The load break elbows and/or S-1 switches will be pulled, locked on the corresponding regulator by the Electrical Contractor, and the S-1 cabinet will be locked by the Contractor.
- The Electrical Contractor and the Airport electricians must fill out lock-out/tag-out forms before leaving the Vault.
- Upon completion of the lock-out, the Contractor will remove all locks and install the load breaks and/or S-1 switches. All circuits must be verified operational in the manual mode on the regulator. Operations will perform a complete check of the lights in the field to verify actual operation.
- When that has been completed, the Airport electricians will notify the Airport Operations when lock-in is complete and regulators are in active control; Operations will notify the ATCT that they have control of the airfield lighting.
- Complete lock-out/lock-in forms.

#### 18.2.4 Contractor Employee Safety

The Contractor and its employees shall employ safe practices per the Contractor's safety procedures and industry safety standards. The Contractor's safety procedures will ultimately dictate the use of protective clothing and equipment for its employees, but at a minimum, the Contractor's employees must be equipped with a Type 2 safety vest, and every employee that enters the site must be wearing said vest. The vest must be worn the entire time that the employee is within the AOA.



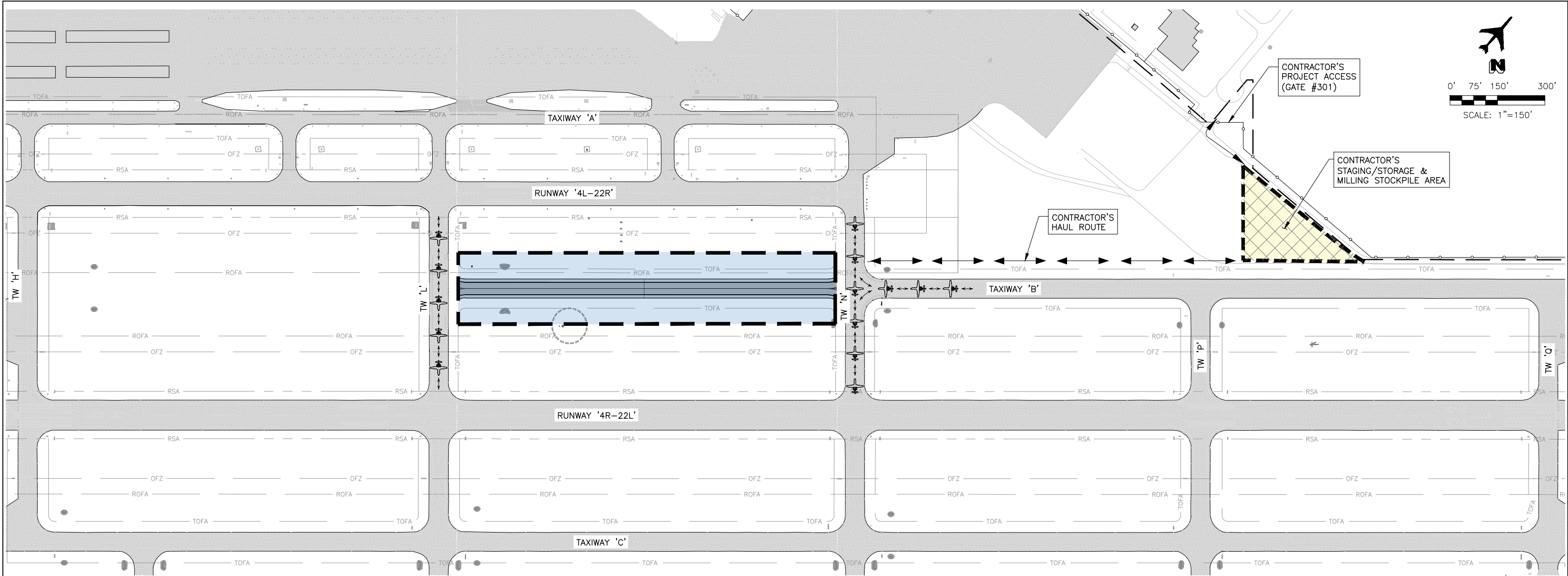


## **Appendix A    Construction Phasing Plans**





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PROJECT ELEMENTS

PHASE 1  
CONSTRUCTION OUTSIDE OF TAXIWAY  
OBJECT FREE AREA. GRADING, PAVING  
& ELECTRICAL

DURATION

42 CALENDAR DAYS

LEGEND



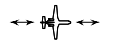
PHASE 1



CONTRACTOR'S  
STAGING/STORAGE &  
MILLINGS STOCKPILE AREA



CONTRACTOR'S HAUL ROUTE



AIRCRAFT ROUTE DURING  
CONSTRUCTION PHASE

PHASING NOTES

1. ALL DURATIONS ARE CALENDAR DAYS.
2. BARRICADE PLACEMENT MAY BE ADJUSTED AT THE DISCRETION OF THE CITY AND/OR AIRPORT STAFF TO ACCOMMODATE SPECIFIC AIRCRAFT MOVEMENT NEEDS.
3. CONTRACTOR SHALL HOLD SAFETY BRIEFINGS WITH AIRPORT STAFF PRIOR TO THE START OF PHASE 1.
4. CONTRACTOR SHALL COORDINATE WITH AIRPORT FOR TAXIWAY LIGHTING & SIGNAGE CIRCUIT LOCKOUT/TAGOUT PROCEDURE.
5. TAXIWAY 'L' & TAXIWAY 'N' MAY NOT BE CLOSED AT THE SAME TIME.

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: DSO  
DRAWN BY: ERG  
SHEET CHK'D BY: MJH  
CROSS CHK'D BY: DHD  
APPROVED BY: DHD  
DATE: 09/27/24



CITY OF CHANDLER, ARIZONA  
CHANDLER MUNICIPAL AIRPORT  
TAXIWAY 'B' IMPROVEMENTS PHASE 1:  
TAXIWAY 'L' TO TAXIWAY 'N'

CONSTRUCTION PHASING &  
BARRICADE PLAN  
PHASE 1



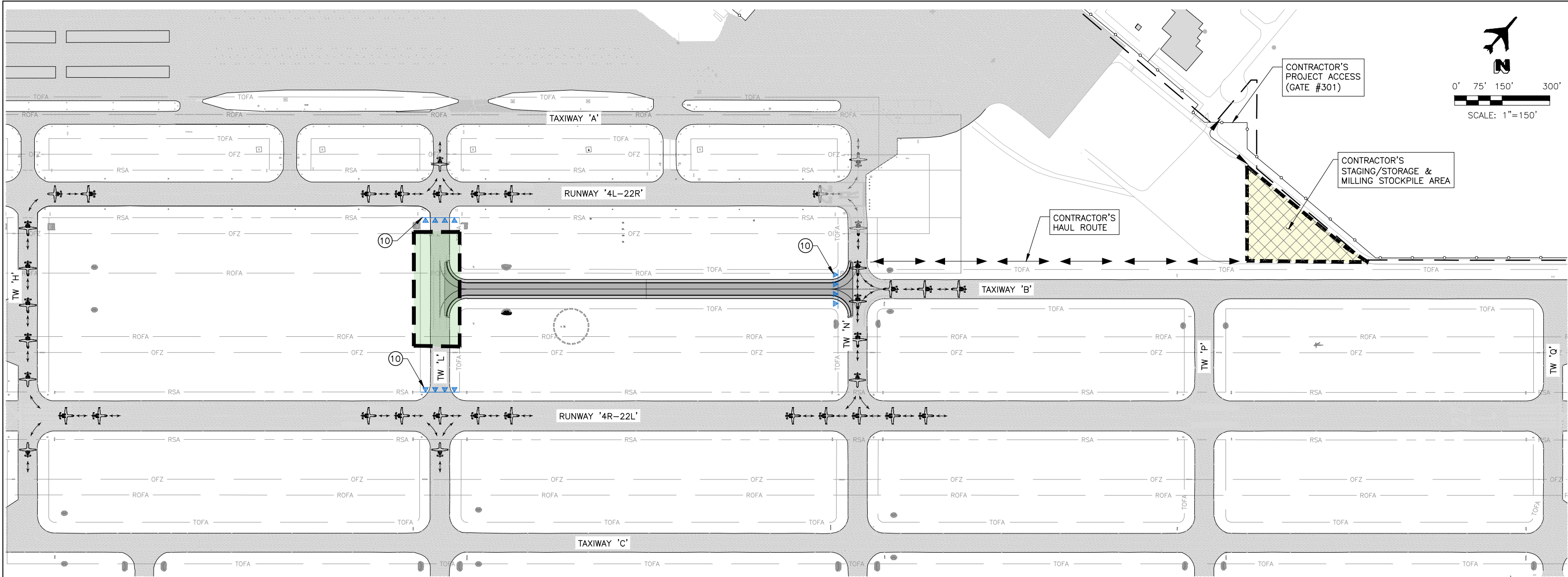
PROJECT NO. 1021015.11  
FILE NAME: 21015\_11-G31.DWG  
APPENDIX  
A-1







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○	CONSTRUCTION NOTES	○
⑩	LOW PROFILE BARRICADES W/ OMNI-DIRECTIONAL LIGHTS DET 1, DWG G3.0	NPI

PROJECT ELEMENTS

PHASE 3  
CONSTRUCTION IMPACTING TAXIWAY 'L'  
REQUIRING ITS CLOSURE, GRADING,  
PAVING & ELECTRICAL.

DURATION

21 CALENDAR DAYS  
CONCURRENT W/PHASE 1  
SEQUENTIAL W/PHASE 2

	LEGEND
	PHASE 3
	CONTRACTOR'S STAGING/STORAGE & MILLINGS STOCKPILE AREA
	LOW-PROFILE BARRICADES
	CONTRACTOR'S HAUL ROUTE
	AIRCRAFT ROUTE DURING CONSTRUCTION PHASE

	PHASING NOTES
1.	ALL DURATIONS ARE CALENDAR DAYS.
2.	BARRICADE PLACEMENT MAY BE ADJUSTED AT THE DISCRETION OF THE CITY AND/OR AIRPORT STAFF TO ACCOMMODATE SPECIFIC AIRCRAFT MOVEMENT NEEDS.
3.	CONTRACTOR SHALL COORDINATE WITH AIRPORT FOR TAXIWAY LIGHTING & SIGNAGE CIRCUIT LOCKOUT/TAGOUT PROCEDURE.

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: DSO  
DRAWN BY: ERG  
SHEET CHK'D BY: MJH  
CROSS CHK'D BY: DHD  
APPROVED BY: DHD  
DATE: 09/27/24



CITY OF CHANDLER, ARIZONA  
CHANDLER MUNICIPAL AIRPORT  
TAXIWAY 'B' IMPROVEMENTS PHASE 1:  
TAXIWAY 'L' TO TAXIWAY 'N'

CONSTRUCTION PHASING &  
BARRICADE PLAN  
PHASE 3



PROJECT NO. 1021015.11  
FILE NAME: 21015\_11-G33.DWG  
APPENDIX  
A-3



## **Appendix B    Inspection Checklist**

Item	Action Required (Describe)	No Action Required (Check)
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.		
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.		
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.		

Item	Action Required (Describe)	No Action Required (Check)
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.		
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.		
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 (Describe)	No Action Required (Check)
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 tagout 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		

## **EXHIBIT D**

### **GIS / GPS DATA DELIVERY REQUIREMENTS**

**N/A**

## **EXHIBIT E**

### **FEDERAL PROVISIONS**