SAN ANTONIO
INTERNATIONAL AIRPORT

SPECIFICATIONS AND BID DOCUMENTS FOR

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)

AT

SAN ANTONIO INTERNATIONAL AIRPORT

PROJECT NO. 33-00178 AND 33-00193

AIP NO. 3-48-0192-XX-2013

Prepared By:

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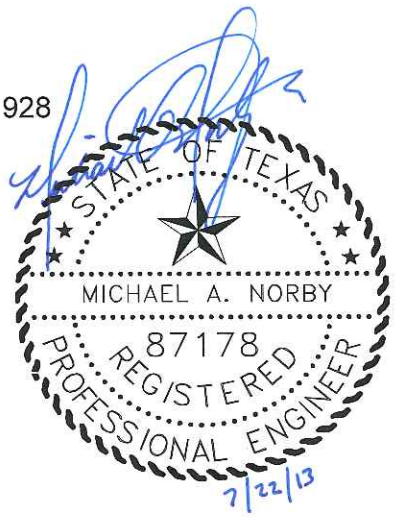
ISSUE FOR BID
July 22, 2013



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CITY OF SAN ANTONIO

Issued By: Aviation Department **Date Issued: July 22, 2013**
ID NO.: 33-00178 and 33-00193

FORMAL INVITATION FOR BIDS (IFB) and CONTRACT
Runway 12R-30L Rehabilitation and Terminal Area Taxiway Improvements (Package 1)

Sealed bids, subject to the Terms and Conditions of this Invitation for Bids and other contract provisions, will be received at the **Office of the City Clerk, City Hall, 100 Military Plaza, 2nd floor San Antonio, Tx 78205** until **2:00 p.m. CST** on **Tuesday, August 20, 2013** and publicly read aloud at **114 W. Commerce, Municipal Plaza Building "B" Room**. This is the *solicitation deadline*. Bids must be submitted in a sealed envelope and clearly marked with the due date of bid, bidder name, Project Name and ID NO. The City is not responsible for submissions not clearly and appropriately marked. Late submissions will be rejected and returned to bidder. A Non-Mandatory Pre-submittal conference will be held at the **San Antonio International Airport, 9800 Airport Blvd., San Antonio, TX 78216 in Terminal A – Mezzanine Conference Room** on **Wednesday, July 31, 2013** at **8:30 am**. A site visit will be made after the pre-submittal conference.

TABLE A - This invitation includes the following Contract Documents:

010	Invitation for Bids and Contract Signature Page	◘	Performance Bond
020	Bid Form	◘	Payment Bond
025	Unit Pricing Form	◘	DBE Good Faith Effort Plan
030	Contractor's Questionnaire	081	General Conditions for Construction Contracts
040	Standard Instructions to Respondent	◘	Heavy/Hwy Wage Decision
060	Supplemental Conditions		Aviation Supplemental Conditions

Plans, Specifications and Special Conditions may be purchased at a cost of **$100.00** per set (tax included) from the office of **Kimley-Horn and Associates, 601 NW Loop 410, Suite 350, San Antonio, TX 78216 Phone- (210) 541-9166**. No refund will be made for plan sets that are returned. Addenda will be posted on the web at www.sanantonio.gov/rfplistings along with this solicitation. Changes to Plans, Specifications and Special Conditions will be included in an addendum and may be obtained from the office of **Kimley-Horn and Associates.** Bidder understands and agrees that bidder is responsible for obtaining addenda and adhering to all requirements in addenda. City is not responsible for incorrect information obtained through other sources.

The following documents (fully completed and with original signatures) constitute the required information to be submitted as a part of the bid proposal clearly marked on the outside of the sealed envelope with the due date of bid, bidder name, Project Name and ID NO as follows:

1.) 010 Invitation for Bids and Contract signature page
2.) 020 Bid Form
3.) 025 Unit Pricing Form
4.) 030 Contractor's Questionnaire
5.) Bid Bond or Cashier's Check
6.) Attachment #1 - DBE Good Faith Effort Plan
7.) Attachment #3 - Letter of Intent
8.) Buy American Certification
9.) Signed Addenda Acknowledgement Forms

It is understood and agreed that the work is to be completed in full on or before **(See Table Below)** calendar days. This project does not include hazardous environmental work. This project requires **2** project sign(s).

Contractual Milestone No.	Contractual Milestone Description and Requirements	From	Duration	Liquidated Damages
1	Base Bid - Phase (Runway Closure): Substantial Completion of Repair Runway12R "Hump" Location, Repair Runway 30L – Shattered Slabs, Construct Taxiway W to the limits of the Runway Safety Area	Coordinated Start Date; Cannot Start Before April 1.	90 Calendar Days	$7,500.00 per day
2	Phase 1A and 1B: Substantial Completion of Widen Inner Taxilane	Notice to Proceed	80 Calendar Days	$5,000.00 per day
3	Phase 2: Substantial Completion of •Construct Taxiway Connector G2 and a portion of Taxiway G	Substantial Completion of Phase 1A and 1B	45 Calendar days	$5,000.00 per day
4	Phase 3: Substantial Completion of •Construct Taxiway Connector G1 and a portion of Taxiway G	Substantial Completion of Phase 2	45 Calendar days	$5,000.00 per day

FORMAL INVITATION FOR BIDS (IFB) and CONTRACT
Runway 12R-30L Rehabilitation and Terminal Area Taxiway Improvements (Package 1)

(Continued from Page 1)

Contractual Milestone No.	Contractual Milestone Description and Requirements	From	Duration	Liquidated Damages
5	Phase 4: Substantial Completion of •Construct Taxiway Connector G3 and a portion of Taxiway G	Substantial Completion of Phase 3	40 Calendar days	$5,000.00 per day
6	Phase 5A and 5B: Substantial Completion of •Construct Remaining portion of Taxiway W Install Shoulders along Taxiway G Construct A portion of Taxiway G Taxiway W Island	Substantial Completion of Phase 4	50 Calendar days	$5,000.00 per day
7	Final Completion	Final Completion of all Phases.	30 Calendar days	$2,100.00 per day

This is a Public Works Contract and chapter 2258 of the Texas Government Code requires that not less than the prevailing wage rate for work of a similar character in this locality shall be paid all laborers, workmen, and mechanics employed in the construction thereof. The Wage Decision Number **TX130016 01/04/2013 TX16** shall be used on this contract, which is available on the web at http://www.wdol.gov/dba.aspx#0.

This project will have funding from a Federal Aviation Administration (FAA) Grant. ***The award and subsequent issuance of Notice to Proceed for construction of this project are contingent upon the City's receipt of FAA funding. The award of a contract, if it is to be awarded, will be made within 120 calendar days of the date specified for the public bid opening.***

The undersigned, by his/her signature, represents that he/she is authorized to bind the bidder to fully comply with Contract Documents for the amount(s) shown on the accompanying bid sheet(s). The work proposed to be done shall be accepted when fully completed and finished to the entire satisfaction of the City. The undersigned certifies all prices contained in this bid have been carefully checked and are submitted as correct and final. The Bidder by submitting this bid and signing below, acknowledges that he/she has received & read the entire Bid and Contract document and agrees to be bound by the terms therein, has received all Addenda, and agrees to the terms, conditions, and requirements of the bidder's bid proposal and all documents listed in TABLE A above and the enabling Ordinance and associated documentation that form the entire Contract upon approval by the City Council.

Official Name of Company (legal):_____

_____/_____ Signer's Name: _____
Original Signature of Person Authorized to Sign Bid/Contract Date (Please Print or Type)

020 BID FORM

The estimated construction budget for the Base Bid and Additive Alternates 1, 2, 3, 4 and 5 for this contract is **$19,000,000.**

I. BASE BID
Total Amount of Base Bid (Insert Amount in Words and Numbers):

_____ $_____

II. ALTERNATES
Amount of each Alternates (if applicable) insert in Numbers: If Applicable, or write N/A, if not applicable

Additive Alternate Bid No.1:
Total Amount of Bid for Additive Alternate Bid No. 1 (Insert Amount in Words and Numbers):

_____ $_____

Additive Alternate Bid No. 2:
Total Amount of Bid for Additive Alternate Bid No. 2 (Insert Amount in Words and Numbers):

_____ $_____

Additive Alternate Bid No. 3:
Total Amount of Bid for Additive Alternate Bid No. 3 (Insert Amount in Words and Numbers):

_____ $_____

Additive Alternate Bid No. 4:
Total Amount of Bid for Additive Alternate Bid No. 4 (Insert Amount in Words and Numbers):

_____ $_____

Additive Alternate Bid No. 5:
Total Amount of Bid for Additive Alternate Bid No. 5 (Insert Amount in Words and Numbers):

_____ $_____

TOTAL OF BASE BID AND ADDITIVE ALTERNATE BID No. 1, 2, 3, 4, and 5:
(Insert Total Amount in Words and Numbers):

_____ **$**_____

III. UNIT PRICES

Bidders shall submit unit pricing on the 025 Unit Pricing form, and it shall be attached immediately following this sheet.

IV. ALLOWANCES (if applicable)

Official Name of Company (legal)	Telephone No.
Address	Fax No.
City, State and Zip Code	E-mail Address

Name of the proposed **Project Manager:** _____

Name of the proposed **Site Superintendent:** _____

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) — BASE BID

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
1	100.1	Mobilization/Demobilization	LS	1		$ -	
2	100.2	Insurance and Bond	LS	1		$ -	
3	100.3	Airside Safety and Security / Traffic Control	LS	1		$ -	
4	101.1	Preparing Right-of-Way	LS	1		$ -	
5	P-100-2.1	Contractor Quality Control	LS	1		$ -	
6	P-151-4.1	Clearing and Grubbing	AC	2.75		$ -	
7	P-151-4.2	Storm Drain Removal	LF	328		$ -	
8	P-151-4.3	Storm Drain Structure Removal	EA	3		$ -	
9	Item 540	Storm Water Pollution Prevention Plan	LS	1		$ -	
10	P-621-5.1	Concrete Pavement Saw Cut Grooving (Runway)	SY	7,060		$ -	
11	T-901-5.1	Hydro-Mulch Seeding	AC	0.46		$ -	
12	T-904-5.1	Sodding	SY	1,410.00		$ -	
13	T-905-5.1	Topsoiling	CY	560		$ -	
14	D-701-5.3	42" RGRCP, Class V	LF	330		$ -	
15	D-705-5.1	Runway Edge Drain System	LS	1		$ -	
16	D-751-5.2	Catch Basin	EA	2		$ -	
17	GP 60-05	Field Office and Curing Facilities	LS	1		$ -	
18	L-100-5.2	Windcone Relocation	LS	1		$ -	
19	L-100-5.3	Electrical Demolition	LS	0.20		$ -	
20	L-100a-3.1	Photometric Testing	LS	1		$ -	
21	L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable	L.F.	10,400		$ -	
22	L-108-5.2	L-824, Type C, 1/C #6, 5 kV Cable	L.F.	9,100		$ -	
23	L-108-5.3	Bare, 1/C #6, Counterpoise Cable	L.F.	6,000		$ -	
24	L-110-5.1	Single-way 2" Conduit, Direct Buried	L.F.	2,350		$ -	
25	L-110-5.2	Multiple-way Duct, (8) 2-inch Conduit, Direct Buried	L.F.	980		$ -	
26	L-110-5.3	Single-way, (1) 2" Conduit, Concrete Encased	L.F.	2,390		$ -	
27	L-110-5.4	Multiple-way Duct, (4) 2-inch Conduit, Concrete Encased	L.F.	10		$ -	
28	L-110-5.5	Multiple-way Duct, (8) 2-inch Conduit, Concrete Encased	L.F.	250		$ -	
29	L115-5.1	New Concrete Handhole, Type II, Furnished & Installed	EA	3		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) BASE BID

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
30	L115-5.2	Two-Can Junction Can Plaza, Furnished & Installed	EA	3		$ -	
31	L-850-4.1	Salvage and Reinstall In-pavement L-850A Runway Centerline Light with New Isolation Transformers on New or Existing Base	EA	21		$ -	
32	L-850-4.2	Salvage and Reinstall In-pavement L-850B Runway TDZ Light with New Isolation Transformer on New or Existing Base	EA	30		$ -	
33	L-850-4.3	New In-pavement L-850C Runway Edge Light with New Isolation Transformer on New or Existing Base	EA	1		$ -	
34	L-858-5.1	New Size 3, 1-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	1		$ -	
35	L-858-5.3	New Size 3, 3-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	1		$ -	
36	L-858-5.4	New Size 3, 4-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	1		$ -	
37	L-861T-4.1	New L-861T(L) LED Taxiway Edge Light with New Isolation Transformer on New or Existing Base	EA	2		$ -	
38	L-861T-4.3	Salvage and Reinstall L-862 Runway Edge Light with New Isolation Transformer on New or Existing Base	EA	7		$ -	
39	L-867/868-6.1	Size "B" L-867 Base Can for Any New, Reinstalled or Future Fixture in New Asphalt Shoulder	EA	21		$ -	
40	L-867/868-6.3	Size “B” L-868 Base Can – “Standard Installation (New PCCP)”	EA	38		$ -	
41	L-867/868-6.4	Size “B” L-868 Base Can – “Core Drill New PCCP” Installation at Joint or Sawcut	EA	11		$ -	
42	L-867/868-6.5	Size “B” L-868 Base Can – “Diamond Leave-out” Installation at Joint or Sawcut Intersection	EA	2		$ -	
43	L-867/868-6.6	New Size "B" L-867 Blank Base Can Cover	EA	12		$ -	
44	L-867/868-6.8	Concrete Foundation for 1-Module Sign	EA	1		$ -	
45	L-867/868-6.9	Concrete Foundation for 2-Module Sign	EA	2		$ -	
46	L-867/868-6.10	Concrete Foundation for 3-Module Sign	EA	2		$ -	
47	L-867/868-6.11	Concrete Foundation for 4-Module Sign	EA	2		$ -	

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) BASE BID

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
48	SP-XX.X	Contract Allowance	Allow	1		$ -	
49	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	275		$ -	

Total Base Bid Amount: $ -

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #1

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
1	100.1	Mobilization/Demobilization	LS	1		$ -	
2	100.2	Insurance and Bond	LS	1		$ -	
3	100.3	Airside Safety and Security / Traffic Control	LS	1		$ -	
4	101.1	Preparing Right-of-Way	LS	1		$ -	
5	P-100-2.1	Contractor Quality Control	LS	1		$ -	
6	P-151-4.1	Clearing and Grubbing	AC	3.12		$ -	
7	P-151-4.2	Storm Drain Removal	LF	759		$ -	
8	P-151-4.3	Storm Drain Structure Removal	EA	5		$ -	
9	Item 540	Storm Water Pollution Prevention	LS	1		$ -	
10	P-621-5.1	Concrete Pavement Saw Cut Grooving (Runway)	SY	7,060		$ -	
11	T-901-5.1	Hydro-Mulch Seeding	AC	0.16		$ -	
12	T-904-5.1	Sodding	SY	1,410.00		$ -	
13	T-905-5.1	Topsoiling	CY	590		$ -	
14	D-701-5.1	24" RGRCP, Class V	LF	45		$ -	
15	D-701-5.2	30" RGRCP, Class V	LF	45		$ -	
16	D-701-5.3	42" RGRCP, Class V	LF	720		$ -	
17	D-701-5.4	Concrete Pipe Collar	EA	1		$ -	
18	D-751-5.1	Storm Drain Manhole	EA	1		$ -	
19	D-751-5.2	Catch Basin	EA	4		$ -	
20	GP 60-05	Field Office and Curing Facilities	LS	1		$ -	
21	L-100-5.3	Electrical Demolition	LS	0.20		$ -	
22	L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable	L.F.	2,000		$ -	
23	L-108-5.3	Bare, 1/C #6, Counterpoise Cable	L.F.	5,200		$ -	
24	L-110-5.1	Single-way 2" Conduit, Direct Buried	L.F.	990		$ -	
25	L-110-5.3	Single-way, (1) 2" Conduit, Concrete Encased	L.F.	2,240		$ -	
26	L-110-5.4	Multiple-way Duct, (4) 2-inch Conduit, Concrete Encased	L.F.	1,050		$ -	
27	L-110-5.6	Multiple-way Duct, (4) 2-inch HDPE Conduit, Concrete Encased	L.F.	250		$ -	
28	L-110-5.8	System Drain, (1) 2" Conduit, Concrete Encased	L.F.	630		$ -	
29	L115-5.1	New Concrete Handhole, Type II, Furnished & Installed	EA	4		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #1

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
30	L-867/868-6.1	Size "B" L-867 Base Can for Any New, Reinstalled or Future Fixture in New Asphalt Shoulder	EA	17		$ -	
31	L-867/868-6.3	Size “B” L-868 Base Can – “Standard Installation (New PCCP)”	EA	29		$ -	
32	L-867/868-6.4	Size “B” L-868 Base Can – “Core Drill New PCCP” Installation at Joint or Sawcut	EA	1		$ -	
33	L-867/868-6.6	New Size "B" L-867 Blank Base Can Cover	EA	17		$ -	
34	L-867/868-6.7	New Size "B" L-868 Blank Base Can Cover	EA	30		$ -	
35	L-867/868-6.9	Concrete Foundation for 2-Module Sign	EA	2		$ -	
36	L-867/868-6.10	Concrete Foundation for 3-Module Sign	EA	2		$ -	
37	L-867/868-6.13	Sign Base Assembly in New PCCP, Any Single Sign Array	EA	1		$ -	
38	SP-XX.X	Contract Allowance	Allow	1		$ -	
39	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	2,000		$ -	
40	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	SF	1,700		$ -	
41	L-105-6.1	Temporary Jumper, L-824, Type C, 1/C #6, 5 kV Cable in Conduit	L.F.	100		$ -	
42	L-105-6.2	Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable,	L.F.	100		$ -	
43	L-105-6.3	Long Term Secondary Circuit, (2)-1/C #10, Temporary	L.F.	1,010		$ -	
44	L-105-6.4	Temporary, Surface Mounted Single-way 2" Conduit	L.F.	20		$ -	
45	L-105-6.5	Long Term Temporary, Single-way 1-1/4" Conduit	L.F.	50		$ -	
46	L-105-6.6	Long Term Temporary Isolation Transformer - Install	EA	3		$ -	
47	L-105-6.7	Long Term Temporary Stake Mounted Taxiway Edge Light - Install	EA	4		$ -	
48	L-105-6.9	Long Term Temporary Pavement Mounted Taxiway Edge Light - Install	EA	14		$ -	

Total Alternate #1 Bid Amount: $ -

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #1

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #2

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
1	100.1	Mobilization/Demobilization	LS	1		$ -	
2	100.2	Insurance and Bond	LS	1		$ -	
3	100.3	Airside Safety and Security / Traffic Control	LS	1		$ -	
4	101.1	Preparing Right-of-Way	LS	1		$ -	
5	P-100-2.1	Contractor Quality Control	LS	1		$ -	
6	P-101-5.1	Portland Cement Concrete Pavement Removal, Including Thickened Edge and Reinforcement	SY	3,090		$ -	
7	P-101-5.2	Bituminous Pavement Removal	SY	90		$ -	
8	P-101-5.3	Cement-Treated Base Removal	SY	3,340		$ -	
9	P-101-5.4	Concrete Pavement Saw Cut (Full Depth)	LF	150		$ -	
10	P-151-4.1	Clearing and Grubbing	AC	1.28		$ -	
11	P-152-4.1	Unclassified Excavation	CY	3,820		$ -	
12	P-155-8.1	Lime-Treated Subgrade (6" Depth)	SY	5,900		$ -	
13	P-155-8.2	Lime	Ton	130		$ -	
14	Item 540	Storm Water Pollution Prevention	LS	1		$ -	
15	P-209-5.1	Crushed Aggregate Base Course, 6" Depth	SY	5,900		$ -	
16	P-304-8.2	Cement-Treated Base Course, 12" Depth	SY	5,900		$ -	
17	P-501-8.1a	Portland Cement Concrete Pavement, 16"	SY	5,730		$ -	
18	P-604-7.1	Preformed Sealer, 1/2-inch Joint	LF	5,100		$ -	
19	P-604-7.2	Preformed Sealer, 1-inch Joint	LF	510		$ -	
20	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	1,550		$ -	
21	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	SF	2,060		$ -	
22	P-621-5.1	Concrete Pavement Saw Cut Grooving (Runway)	SY	7,060		$ -	
23	T-901-5.1	Hydro-Mulch Seeding	AC	0.20		$ -	
24	T-904-5.1	Sodding	SY	1,410.00		$ -	
25	T-905-5.1	Topsoiling	CY	240		$ -	
26	GP 60-05	Field Office and Curing Facilities	LS	1		$ -	
27	L-100-5.1	ALCMS Modifications (Allowance)	LS	0.25		$ -	
28	L-100-5.2	Windcone Relocation	LS			$ -	
29	L-100-5.3	Electrical Demolition	LS	0.20		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #2

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
30	L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable	L.F.	600		$ -	
31	L-108-5.3	Bare, 1/C #6, Counterpoise Cable	L.F.	900		$ -	
32	L-110-5.3	Single-way, (1) 2" Conduit, Concrete Encased	L.F.	900		$ -	
33	L-110-5.8	System Drain, (1) 2" Conduit, Concrete Encased	L.F.	230		$ -	
34	L-858-5.2	New Size 3, 2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	2		$ -	
35	L-858-5.3	New Size 3, 3-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	4		$ -	
36	L-861T-4.1	New L-861T(L) LED Taxiway Edge Light with New Isolation Transformer on New or Existing Base	EA	11		$ -	
37	L-867/868-6.3	Size “B” L-868 Base Can – “Standard Installation (New PCCP)”	EA	15		$ -	
38	L-867/868-6.7	New Size "B" L-868 Blank Base Can Cover	EA	11		$ -	
39	L-867/868-6.13	Sign Base Assembly in New PCCP, Any Single Sign Array	EA	3		$ -	
40	SP-XX.X	Contract Allowance	Allow	1		$ -	
41	P-101-5.1	Portland Cement Concrete Pavement Removal, Including Thickened Edge and Reinforcement	SY	3,780		$ -	
42	P-101-5.3	Cement-Treated Base Removal	SY	4,080		$ -	
43	P-101-5.4	Concrete Pavement Saw Cut (Full Depth)	LF	160		$ -	
44	P-155-8.1	Lime-Treated Subgrade (6" Depth)	SY	3,800		$ -	
45	P-209-5.1	Crushed Aggregate Base Course, 6" Depth	SY	3,800		$ -	
46	P-304-8.1	Cement-Treated Base Course, 12" Depth	SY	3,800		$ -	
47	P-501-8.1a	Portland Cement Concrete Pavement, 16"	SY	3,780		$ -	
48	P-604-7.1	Preformed Sealer, 1/2-inch Joint	LF	380		$ -	
49	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	570		$ -	
50	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	SF	770		$ -	
51	P-620-5.7	Pavement Making Obliteration	SF	1,270		$ -	
52	L-105-6.1	Temporary Jumper, L-824, Type C, 1/C #6, 5 kV Cable in Conduit	L.F.	70		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #2

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
53	L-105-6.2	Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable,	L.F.	630		$ -	
54	L-105-6.4	Temporary, Surface Mounted Single-way 2" Conduit	L.F.	70		$ -	
55	L-105-6.7	Long Term Temporary Stake Mounted Taxiway Edge Light - Install	EA	8		$ -	
56	L-105-6.10	Long Term Temporary Pavement Mounted Taxiway Edge Light - Remove	EA	6		$ -	

Total Alternate #2 Bid Amount: $ -

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) — ADDITIVE ALTERNATE #3

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
1	100.1	Mobilization/Demobilization	1	LS		$ -	
2	100.2	Insurance and Bond	1	LS		$ -	
3	100.3	Airside Safety and Security / Traffic Control	1	LS		$ -	
4	101.1	Preparing Right-of-Way	1	LS		$ -	
5	P-100-2.1	Contractor Quality Control	1	LS		$ -	
6	P-101-5.1	Portland Cement Concrete Pavement Removal, Including Thickened Edge and Reinforcement	3,970	SY		$ -	
7	P-101-5.4	Concrete Pavement Saw Cut (Full Depth)	310	LF		$ -	
8	P-151-4.1	Clearing and Grubbing	1.64	AC		$ -	
9	P-152-4.1	Unclassified Excavation	4,900	CY		$ -	
10	P-155-8.1	Lime-Treated Subgrade (6" Depth)	7,350	SY		$ -	
11	P-155-8.2	Lime	160	Ton		$ -	
12	Item 540	Storm Water Pollution Prevention	1	LS		$ -	
13	P-208-5.1	Uncrushed Aggregate Base Course, 13" Depth	6,410	SY		$ -	
14	P-209-5.1	Crushed Aggregate Base Course, 6" Depth	6,410	SY		$ -	
15	P-403-8.1	Bituminous Pavement (3" Shoulder Surface Course)	1,050	SY		$ -	
16	P-501-8.1a	Portland Cement Concrete Pavement, 16"	6,300	SY		$ -	
17	P-604-7.1	Preformed Sealer, 1/2-inch Joint	5,170	LF		$ -	
18	P-604-7.2	Preformed Sealer, 1-inch Joint	280	LF		$ -	
19	TxDOT 712.3a	Edge Seal (Hot Applied Joint Routing and Sealing)	330	LF		$ -	
20	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	2,370	SF		$ -	
21	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	2,320	SF		$ -	
22	P-621-5.1	Concrete Pavement Saw Cut Grooving (Runway)	7,060	SY		$ -	
23	T-901-5.1	Hydro-Mulch Seeding	0.13	AC		$ -	
24	T-904-5.1	Sodding	1,410.00	SY		$ -	
25	T-905-5.1	Topsoiling	310	CY		$ -	
26	GP 60-05	Field Office and Curing Facilities	1	LS		$ -	
27	L-100-5.1	ALCMS Modifications (Allowance)	0.25	LS		$ -	
28	L-100-5.2	Windcone Relocation		LS		$ -	
29	L-100-5.3	Electrical Demolition	0.20	LS		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #3

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
30	L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable	2,400	L.F.		$ -	
31	L-108-5.3	Bare, 1/C #6, Counterpoise Cable	1,600	L.F.		$ -	
32	L-110-5.1	Single-way 2" Conduit, Direct Buried	510	L.F.		$ -	
33	L-110-5.3	Single-way, (1) 2" Conduit, Concrete Encased	860	L.F.		$ -	
34	L-110-5.4	Multiple-way Duct, (4) 2-inch Conduit, Concrete Encased	240	L.F.		$ -	
35	L-110-5.8	System Drain, (1) 2" Conduit, Concrete Encased	310	L.F.		$ -	
36	L-858-5.2	New Size 3, 2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	1	EA		$ -	
37	L-858-5.3	New Size 3, 3-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	3	EA		$ -	
38	L-861T-4.1	New L-861T(L) LED Taxiway Edge Light with New Isolation Transformer on New or Existing Base	20	EA		$ -	
39	L-861T-4.2	Spare L-861T(L) LED Taxiway Edge Light with New Isolation Transformer	8	EA		$ -	
40	L-867/868-6.1	Size "B" L-867 Base Can for Any New, Reinstalled or Future Fixture in New Asphalt Shoulder	14	EA		$ -	
41	L-867/868-6.3	Size “B” L-868 Base Can – “Standard Installation (New PCCP)”	14	EA		$ -	
42	L-867/868-6.7	New Size "B" L-868 Blank Base Can Cover	9	EA		$ -	
43	L-867/868-6.10	Concrete Foundation for 3-Module Sign	3	EA		$ -	
44	SP-XX.X	Contract Allowance	1	Allow		$ -	
45	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	450	SF		$ -	
46	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	675	SF		$ -	
47	P-620-5.7	Pavement Making Obliteration	1,500	SF		$ -	
48	L-105-6.2	Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable,	730	L.F.		$ -	
49	L-105-6.3	Long Term Secondary Circuit, (2)-1/C #10, Temporary	320	L.F.		$ -	
50	L-105-6.6	Long Term Temporary Isolation Transformer - Install	1	EA		$ -	

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PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) — ADDITIVE ALTERNATE #3

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
51	L-105-6.7	Long Term Temporary Stake Mounted Taxiway Edge Light - Install	5	EA		$ -	
52	L-105-6.9	Long Term Temporary Pavement Mounted Taxiway Edge Light - Install	4	EA		$ -	
53	L-105-6.10	Long Term Temporary Pavement Mounted Taxiway Edge Light - Remove	4	EA		$ -	

Total Alternate #3 Bid Amount: $ -

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #4

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
1	100.1	Mobilization/Demobilization	LS	1		$ -	
2	100.2	Insurance and Bond	LS	1		$ -	
3	100.3	Airside Safety and Security / Traffic Control	LS	1		$ -	
4	101.1	Preparing Right-of-Way	LS	1		$ -	
5	P-100-2.1	Contractor Quality Control	LS	1		$ -	
6	P-101-5.1	Portland Cement Concrete Pavement Removal, Including Thickened Edge and Reinforcement	SY	3,150		$ -	
7	P-101-5.4	Concrete Pavement Saw Cut (Full Depth)	LF	190		$ -	
8	P-151-4.1	Clearing and Grubbing	AC	1.07		$ -	
9	P-152-4.1	Unclassified Excavation	CY	3,200		$ -	
10	P-155-8.1	Lime-Treated Subgrade (6" Depth)	SY	4,820		$ -	
11	P-155-8.2	Lime	Ton	100		$ -	
12	Item 540	Storm Water Pollution Prevention	LS	1		$ -	
13	P-209-5.1	Crushed Aggregate Base Course, 6" Depth	SY	4,890		$ -	
14	P-304-8.2	Cement-Treated Base Course, 12" Depth	SY	4,340		$ -	
15	P-403-8.1	Bituminous Pavement (3" Shoulder Surface Course)	SY	530		$ -	
16	P-501-8.1a	Portland Cement Concrete Pavement, 16"	SY	4,270		$ -	
17	P-604-7.1	Preformed Sealer, 1/2-inch Joint	LF	3,600		$ -	
18	P-604-7.2	Preformed Sealer, 1-inch Joint	LF	230		$ -	
19	TxDOT 712.3a	Edge Seal (Hot Applied Joint Routing and Sealing)	LF	210		$ -	
20	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	2,280		$ -	
21	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	SF	2,070		$ -	
22	P-620-5.6	Non-Reflective Green Infield Pavement Markings, Waterborne	SF	7,220		$ -	
23	P-621-5.1	Concrete Pavement Saw Cut Grooving (Runway)	SY	7,060		$ -	
24	T-901-5.1	Hydro-Mulch Seeding	AC	0.10		$ -	
25	T-904-5.1	Sodding	SY	1,410.00		$ -	
26	T-905-5.1	Topsoiling	CY	200		$ -	
27	GP 60-05	Field Office and Curing Facilities	LS	1		$ -	
28	L-100-5.1	ALCMS Modifications (Allowance)	LS	0.25		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #4

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
29	L-100-5.2	Windcone Relocation	LS			$ -	
30	L-100-5.3	Electrical Demolition	LS	0.20		$ -	
31	L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable	L.F.	3,400		$ -	
32	L-108-5.3	Bare, 1/C #6, Counterpoise Cable	L.F.	1,200		$ -	
33	L-110-5.1	Single-way 2" Conduit, Direct Buried	L.F.	340		$ -	
34	L-110-5.3	Single-way, (1) 2" Conduit, Concrete Encased	L.F.	590		$ -	
35	L-110-5.4	Multiple-way Duct, (4) 2-inch Conduit, Concrete Encased	L.F.	200		$ -	
36	L-110-5.8	System Drain, (1) 2" Conduit, Concrete Encased	L.F.	170		$ -	
37	L-852-4.1	Salvage and Reinstall In-pavement L-852C Taxiway Centerline Light with New Isolation Transformer on New or Existing Base	EA	14		$ -	
38	L-852-4.2	New L-852C Taxiway Centerline Light with New Isolation Transformer on New or Existing Base	EA	11		$ -	
39	L-858-5.2	New Size 3, 2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	1		$ -	
40	L-858-5.3	New Size 3, 3-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	3		$ -	
41	L-861T-4.1	New L-861T(L) LED Taxiway Edge Light with New Isolation Transformer on New or Existing Base	EA	17		$ -	
42	L-861T-4.2	Spare L-861T(L) LED Taxiway Edge Light with New Isolation Transformer	EA	8		$ -	
43	L-867/868-6.1	Size "B" L-867 Base Can for Any New, Reinstalled or Future Fixture in New Asphalt Shoulder	EA	6		$ -	
44	L-867/868-6.3	Size “B” L-868 Base Can – “Standard Installation (New PCCP)”	EA	10		$ -	
45	L-867/868-6.9	Concrete Foundation for 2-Module Sign	EA	1		$ -	
46	L-867/868-6.10	Concrete Foundation for 3-Module Sign	EA	2		$ -	
47	SP-XX.X	Contract Allowance	Allow	1		$ -	
48						$ -	
49	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	330		$ -	

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PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) — ADDITIVE ALTERNATE #4

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
50	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	SF	330		$ -	
51	P-620-5.7	Pavement Making Obliteration	SF	1,550		$ -	
52	L-105-6.2	Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable,	L.F.	370		$ -	
53	L-105-6.7	Long Term Temporary Stake Mounted Taxiway Edge Light - Install	EA	9		$ -	
54	L-105-6.10	Long Term Temporary Pavement Mounted Taxiway Edge Light - Remove	EA	4		$ -	
						$ -	

Total Alternate #4 Bid Amount: $ -

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) — ADDITIVE ALTERNATE #5

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
1	100.1	Mobilization/Demobilization	LS	1		$ -	
2	100.2	Insurance and Bond	LS	1		$ -	
3	100.3	Airside Safety and Security / Traffic Control	LS	1		$ -	
4	101.1	Preparing Right-of-Way	LS	1		$ -	
5	P-100-2.1	Contractor Quality Control	LS	1		$ -	
6	P-151-4.1	Clearing and Grubbing	AC	1.17		$ -	
7	P-152-4.1	Unclassified Excavation	CY	3,500		$ -	
8	P-155-8.1	Lime-Treated Subgrade (6" Depth)	SY	5,070		$ -	
9	P-155-8.2	Lime	Ton	110		$ -	
10	Item 540	Storm Water Pollution Prevention	LS	1		$ -	
11	P-208-5.1	Uncrushed Aggregate Base Course, 13" Depth	SY	3,030		$ -	
12	P-209-5.1	Crushed Aggregate Base Course, 6" Depth	SY	2,330		$ -	
13	P-304-8.1	Cement-Treated Base Course, 10" Depth	SY	1,030		$ -	
14	P-304-8.2	Cement-Treated Base Course, 12" Depth	SY	2,330		$ -	
15	P-403-8.1	Bituminous Pavement (3" Shoulder Surface Course)	SY	2,920		$ -	
16	P-501-8.1a	Portland Cement Concrete Pavement, 16"	SY	2,330		$ -	
17	P-604-7.1	Preformed Sealer, 1/2-inch Joint	LF	2,060		$ -	
18	P-604-7.2	Preformed Sealer, 1-inch Joint	LF	350		$ -	
19	TxDOT 712.3a	Edge Seal (Hot Applied Joint Routing and Sealing)	LF	1,120		$ -	
20	P-620-5.1	Reflective Yellow Taxiway Pavement Markings, Waterborne	SF	4,070		$ -	
21	P-620-5.3	Non-Reflective Black Runway and Taxiway Pavement Markings, Waterborne	SF	3,970		$ -	
22	P-620-5.4	Reflective Holding Position Markings, Pre-formed Thermoplastic	SF	1,180		$ -	
23	P-620-5.6	Non-Reflective Green Infield Pavement Markings, Waterborne	SF	24,210		$ -	
24	P-620-5.7	Pavement Making Obliteration	SF	1,490		$ -	
25	P-621-5.1	Concrete Pavement Saw Cut Grooving (Runway)	SY	7,060		$ -	
26	T-901-5.1	Hydro-Mulch Seeding	AC	0.33		$ -	
27	T-904-5.1	Sodding	SY	1,410.00		$ -	
28	T-905-5.1	Topsoiling	CY	220		$ -	

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) ADDITIVE ALTERNATE #5

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
29	GP 60-05	Field Office and Curing Facilities	LS	1		$ -	
30	L-100-5.1	ALCMS Modifications (Allowance)	LS	0.25		$ -	
31	L-100-5.3	Electrical Demolition	LS	0.20		$ -	
32	L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable	L.F.	4,600		$ -	
33	L-108-5.3	Bare, 1/C #6, Counterpoise Cable	L.F.	2,200		$ -	
34	L-110-5.1	Single-way 2" Conduit, Direct Buried	L.F.	1,250		$ -	
35	L-110-5.3	Single-way, (1) 2" Conduit, Concrete Encased	L.F.	210		$ -	
36	L-110-5.7	Single-way Duct, (1) 2" Conduit, Saw-cut in Existing PCCP	L.F.	720		$ -	
37	L-852-4.2	New L-852C Taxiway Centerline Light with New Isolation Transformer on New or Existing Base	EA	5		$ -	
38	L-852-4.3	New L-852K Taxiway Centerline Light with New Isolation Transformer on New or Existing Base	EA	7		$ -	
39	L-858-5.2	New Size 3, 2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	2		$ -	
40	L-858-5.3	New Size 3, 3-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	2		$ -	
41	L-858-5.4	New Size 3, 4-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	1		$ -	
42	L-858-5.6	New Size 3, 3+2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	2		$ -	
43	L-858-5.6	New Size 3, 4+2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly	EA	2		$ -	
44	L-861T-4.1	New L-861T(L) LED Taxiway Edge Light with New Isolation Transformer on New or Existing Base	EA	46		$ -	
45	L-861T-4.2	Spare L-861T(L) LED Taxiway Edge Light with New Isolation Transformer	EA	10		$ -	
46	L-867/868-6.1	Size "B" L-867 Base Can for Any New, Reinstalled or Future Fixture in New Asphalt Shoulder	EA	19		$ -	
47	L-867/868-6.2	Size "B" L-867 Base Can Core Drill in Existing PCCP	EA	12		$ -	
48	L-867/868-6.3	Size “B” L-868 Base Can – “Standard Installation (New PCCP)”	EA	9		$ -	

CITY OF SAN ANTONIO
025 UNIT PRICING FORM

PROJECT NAME: RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1) — ADDITIVE ALTERNATE #5

PROJECT NO. 33-00178 AND 33-00193 (AIP NO 3-48-0192-XX-2013)

ITEM NO.	S.P. NO	BID ITEM DESCRIPTION	UNIT OF MEASURE	APPROX. QUANTITIES	UNIT BID PRICE	AMOUNT	ITEM SEQUENCE NO.
49	L-867/868-6.12	Concrete Foundation for 4+2-Module Sign	EA	2		$ -	
50	L-867/868-6.14	Sign Base Assembly in Existing PCCP, Any Single Sign Array	EA	1		$ -	
51	L-867/868-6.15	Sign Base Assembly on Existing PCCP, 3+2-Module	EA	2		$ -	
52	SP-XX.X	Contract Allowance	Allow	1		$ -	
53	P-620-5.7	Pavement Making Obliteration	SF	2,800		$ -	
54	L-105-6.8	Long Term Temporary Stake Mounted Taxiway Edge Light - Remove	EA	10		$ -	
55	L-105-6.10	Long Term Temporary Pavement Mounted Taxiway Edge Light - Remove	EA	4		$ -	

Total Alternate #5 Bid Amount: $ -

_____certifies that the unit prices shown on this complete computer print-out for all of the bid items and the alternates contained in this proposal are the unit prices intended and that its bid will be tabulated using these unit prices and no other information from this print-out.

_____Acknowleged and agrees that the total bid amount shown will be read as its total bid and further agrees that the official total bid amount will be determined by multiplying the unit bid prices shown in this print-out by the respective estimated quantities shown in the proposal and then totaling all of the extended amounts. _____ agrees to the terms, conditions, and requirements of the bidder's bid proposal.

Signed: _____ Date: _____

Title: _____

Section 030
CONTRACTOR'S QUESTIONNAIRE
RUNWAY 12R-30L REHABILITATION AND
TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)
SAN ANTONIO INTERNATIONAL AIRPORT

1. **Respondent Information:** Provide the following information regarding the Respondent.
(NOTE: Co-Respondents are two or more entities proposing as a team or joint venture with each signing the contract, if awarded. Sub-contractors are not Co-Respondents and should not be identified here. If this proposal includes Co-Respondents, provide the required information in this Item #1 for each Co-Respondent by copying and inserting an additional block(s) before Item #1.2. If Joint Venture or Partnership, attach Joint Venture or Partnership Agreement.)

Respondent Name: _____
(NOTE: Give exact legal name as it will appear on the contract, if awarded.)
Principal Address: _____
City: State: Zip Code: _____
Telephone No. _____ Fax No: _____
e-mail address: _____

List here, any other names under which Respondent has operated within the last 10 years. (add space as needed) _____
_____

1.2 **Business Structure:** Check the box that indicates the business structure of the Respondent.
☐Individual or Sole Proprietorship If checked, list Assumed Name, if any: _____
☐Partnership
☐Corporation If checked, check one: ☐For-Profit ☐Nonprofit
Also, check one: ☐Domestic ☐Foreign
☐Other If checked, list business structure: _____

1.3 **Ownership:** Does Respondent anticipate any mergers, transfer of organization ownership, management reorganization, or departure of key personnel within the next twelve (12) months?
☐Yes ☐No

1.4 Is Respondent authorized and/or licensed to do business in Texas?
☐Yes ☐No If "Yes", list authorizations/licenses.
_____
_____

1.5 Where is the Respondent's corporate headquarters located? _____

1.6 **Debarment/Suspension Information:** Has the Respondent or any of its principals been debarred or suspended from contracting with any public entity?
☐Yes ☐No If "Yes", identify the public entity and the name and current phone number of a representative of the public entity familiar with the debarment or suspension, and state the reason for or circumstances surrounding the debarment or suspension, including but not limited to the period of time for such debarment or suspension.
_____
_____

1.7 **Surety Information:** Has the Respondent ever had a bond or surety canceled or forfeited?
☐Yes ☐No If "Yes", state the name of the bonding company, date, amount of bond and reason for such cancellation or forfeiture.

_____

_____

1.8 **Bankruptcy Information:** Has the Respondent ever been declared bankrupt or filed for protection from creditors under state or federal proceedings?
☐Yes ☐No If "Yes", state the date, court, jurisdiction, cause number, amount of liabilities and amount of assets.

_____

_____

1.9 **LITIGATION DISCLOSURE - Failure to fully and truthfully disclose the information required by this Litigation Disclosure may result in the disqualification of your bid/proposal from consideration or termination of the contract, once awarded.**

A. Have you or any member of your Firm or Team to be assigned to this engagement ever been indicted or convicted of a felony or misdemeanor greater than a Class C in the last five (5) years?
☐Yes ☐No

B. Have you or any member of your Firm or Team been terminated (for cause or otherwise) from any work being performed for the City of San Antonio or any other Federal, State or Local Government, or Private Entity?
☐Yes ☐No

C. Have you or any member of your Firm or Team been involved in any claim or litigation with the City of San Antonio or any other Federal, State or Local Government, or Private Entity during the last ten (10) years?
☐Yes ☐No

D. Have you or any other member of your Firm or Team paid liquidated damages in the last three (3) years?
☐Yes ☐No

If you have answered "Yes" to any of the above questions, please indicate the name(s) of the person(s), the nature, and the status and/or outcome of the information, indictment, conviction, termination, claim or litigation, as applicable. Any such information should be provided on a separate page and submitted with your bid as Attachment 1.9.

2. EXPERIENCE AND QUALIFICATIONS

2.1 Prospective Respondents must show and document that they are responsible, qualified, capable, bondable, etc. to fulfill and abide by the specifications herein listed, and prospective respondents must have the capability and capacity in all respects to fully satisfy all of the contractual requirements described in this solicitation.

2.2 All Respondents' facilities, personnel and equipment may be subject to inspection before contract award.

2.3 How many years has your current organization been doing business as a construction general contractor? _____ years. If less than three years please explain on a separate page with your bid as Attachment 2.3 your organization's construction general contractor history.

2.4 How many years have you been doing construction-contracting work under previous business name(s)? _____ years.

2.5 **RELEVANT EXPERIENCE WITH AIRPORT RUNWAY AND TAXIWAY PROJECTS:** Bids shall be considered from responsible respondents with experience in airport runway and taxiway construction projects using Federal Aviation Administration (FAA) funds and construction specifications. The respondent's experience, in combination with its subcontractors' experience, should include three (3) airport runway/taxiway projects within the last five (5) years which include airport paving, as a minimum.

Contractor should include Project Summary Sheets that demonstrate knowledge of sequencing, staging and constructing challenges in limited areas and schedules for work due to airport environments. Project Summary Sheets should describe specific experience with airfield paving, pavement marking, electrical, and signage using FAA construction specifications. Each Project Summary Sheet should include: project name, project scope, location, duration (start and end dates), and reference (owner name with a phone number and e-mail address). The respondents should include the said "Project Summary Sheets" as Attachment 2.5 for Section 030, Contractor's Questionnaire. Bids submitted without required experience and documentation of airport runway and taxiway projects may be deemed non-responsive.

3. FINANCIAL

3.1 Please indicate the current limit of your BONDING CAPACITY: _____. **This limit indication reduces your risk of forfeiting a bid bond.** Properly informing the CITY of your current capacity for BONDED work allows the determination of awards in cases where a CONTRACTOR has the low bids for multiple projects and that total amount exceeds the capacity for bonding. If this section is left blank, CONTRACTOR agrees to be fully responsible for all active bid submissions to the limit of their respective bid bonds.

3.2 How much work is your firm currently contracted to provide? I.E. current total amount of work in dollars from ALL sources.

$_____

This page left blank intentionally

040

STANDARD INSTRUCTIONS TO RESPONDENT

Read Carefully

1. STANDARD TERMS AND CONDITIONS

1.1 By submitting this offer, the Respondent:

(a) Affirms that they are duly authorized to execute the proposed contract, that this company, corporation, firm, partnership or individual has not prepared this offer in collusion with any other Respondent, and that the contents of this offer as to prices, terms or conditions of said offer have not been communicated by the undersigned nor by any employee or agent to any other person engaged in this type of business prior to the public offer opening or official award of this contract, as applicable.

(b) Represents that to the best of its knowledge it is not indebted to the City of San Antonio (City). Indebtedness to the City may be basis for non-award and/or cancellation of any award.

(c) Agrees to comply with City Ordinance Number 2008-11-20-1045 concerning Wage and Hour Labor Standard Provisions for City of San Antonio Construction Projects (amending City Ordinance Number 71312).

(d) Agrees to comply with overtime regulations and pay workers the prevailing wage rate as listed in the wage decision noted on the Invitation for Bids and Contract Form 010 or Invitation for Competitive Sealed Proposals Form 011 specific to the solicitation. The Wage Decision is subject to change by addendum to the Invitation for Sealed Bids or Invitation for Competitive Sealed Proposals (hereafter referred to as the "solicitation") or as a result of the City's Wage Decision is on the Department of Labor web-site (search by DBA wage decision number) http://www.wdol.gov/dba.aspx#0.

1.2 Respondents are required to submit their offers upon the following expressed conditions:

(a) Respondents shall thoroughly examine the drawings, specifications, schedule(s), instructions and all other contract documents.

(b) Respondents shall make all investigations necessary to thoroughly inform themselves regarding the conditions at the Project site, the Specifications, the Plans and any Addenda to the Specifications and/or Plans issued. No plea of ignorance by the Respondent of conditions that exist or that may hereafter exist as a result of failure or omission on the part of the Respondent to make the necessary examinations and investigations, or failure to fulfill in every detail the requirements of the contract documents, will be accepted as a basis for varying the requirements of the City or the compensation to the vendor.

(c) Respondents are advised that all City contracts are subject to all legal requirements provided for in the City Charter and/or applicable City Ordinances, state and federal statutes. Any offer, after being opened, becomes subject to the Open Information Act, V.T.C.A. Government Code Chapter 552, therefore vendors must clearly indicate any portion of the submitted offer that the vendor claims is not subject to public inspection under the Open Information Act.

(d) No officer or employee of the City shall have a financial interest, direct or indirect, in any contract with the City, or shall benefit financially, directly or indirectly, in the sale to the City of any materials, supplies or services, except on behalf of the City as an officer or employee.

This prohibition extends to the City Public Service Board, San Antonio Water System, and all City boards and commissions other than those which are purely advisory. In this instance a City employee is defined as any employee of the City who is required to file a financial involvement report pursuant to the City's ethics ordinance.

1.3 For federally funded projects, the Respondent certifies the following:

(a) Certifies that it does not and will not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not and will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained.

(b) Certifies (in accordance with the guidelines below) that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency OR where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this offer.

GUIDELINES FOR CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION -- LOWER TIER COVERED TRANSACTIONS

By signing and submitting this offer, the prospective lower tier participant is providing the certification set out below.

1. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

2. The prospective lower tier participant shall provide immediate written notice to the person to which this offer is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or had become erroneous by reason of changed circumstances.

3. The terms covered transaction, debarred, suspended, ineligible, lower tier covered transaction, participant, person, primary covered transaction, principal, proposal, and voluntarily excluded, as used in this clause, have the meaning set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this offer is submitted for assistance in obtaining a copy of those regulations.

4. The prospective lower tier participant agrees by submitting this offer that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.

5. The prospective lower tier participant further agrees by submitting this offer that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion -- Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

6. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not proposed for debarment under 48 CFR part 9, subpart 9.4, debarred, suspended, ineligible, or voluntarily excluded from covered transactions, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant

may, but is not required to, check the List of Parties Excluded from Federal Procurement and Nonprocurement Programs.

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

8. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is proposed for debarment under 48 CFR part 9, subpart 9.4, suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

2. DISCREPANCIES AND INTERPRETATION

(a) Prospective Respondents shall notify Consultant and City in writing at least five (5) calendar days prior to scheduled Offer Opening date if discrepancies and ambiguities or omissions are found in the Project Plans and/or Specifications, or if further information or interpretation is desired.

(b) Answers by Consultant and/or City will be given in writing to all prospective Respondents in Addendum form. All provisions and requirements of such addenda will supersede or modify affected portions of the Project Plans and/or Specifications. All addenda will be incorporated in and bound with the Contract Documents. No other explanation or interpretation will be considered official or binding upon the City.

3. PREPARATION OF BIDS OR PROPOSALS

Offers will be prepared in accordance with the following:

(a) All information required by the invitation for offers shall be furnished or the bid/proposal may be deemed non-responsive.

(b) Respondents shall complete the "020 Bid Form or 020 Proposal Form" and include the completed form in their proposal as directed in the IFB or RFCSP. Failure to complete and submit this form may render Respondent's bid/proposal nonresponsive.

(c) If applicable, Respondents shall submit unit pricing either on the forms provided by the City or its Consultant or an original computer printout sheet bearing certification by and signature for the offering firm. The unit prices shown on acceptable printouts will be unit prices used to tabulate the offer and used in the contract if awarded by the City. As a minimum, computer printouts must contain the information and in the arrangement shown on the 025 Unit Pricing form included in the City's solicitation documents. Proposals with unit prices by computer printout may be considered nonresponsive if:

1. The proposal does not bear the certification verbatim, as shown on the example in the City's solicitation documents.

2. The computer printout is not signed in the name of the firm to whom the proposal was issued.

3. The computer printout omits or alters required offer items or includes items not shown in the City's solicitation documents or specifications.

If the proposal submitted by the Respondent contains both the form furnished by the City, completed according to the instructions, and also a computer printout, completed according to the instructions, only one will be considered. In this situation the offer prices shown on the computer printout will be used to determine the offer.

(d) Respondents shall submit a unit price for each Work element pay item for which an offer is requested, except in the case of an alternate. In such a case, the procedure is as follows:

1. Additive Alternate: In the case of Additive Alternates, unit prices must be submitted for the base offer and the items in all proposed additive alternates separately.

2. Substitute Alternate: In the case of a Substitute Alternate (these alternates appear in sets of two or more related alternates), unit prices must be submitted for all the items in the base offer separately and for all the items in one of the related substitute alternates in each set.

(e) Where there is an error in extension of price, the unit price shall govern, be extended by he consultant and provided back to the respondent.

(f) If a Respondent detects an error in quantities on the specifications or solicitation documents, unit price shall govern. Respondent shall notify the City of such error by indicating in the comments section of the bid/pricing form or beside the item on the City's proposal form or computer printout referenced in 3. (e) above. Respondent should not attempt to correct the error by inflating unit pricing.

(g) In the event additional or extra blank spaces remain after completion of the various forms, Contractor shall enter the terms "none" or "not applicable" on any remaining blank spaces to indicate that the Contractor has considered City requests for information on every line presented. Any blank unit prices will be tabulated and evaluated as "no cost" to the City.

(h) The combined total offers for Mobilization and Preparing Right-of-Way, shall not exceed eight percent (8%) of the total project offer. The 8% allowed for Mobilization and Preparing Right-of-Way will be calculated based upon the total of all offer components An offer containing a combined total for Mobilization and Preparing Right-of-Way in excess of eight (8%) percent may be considered unbalanced and may be rejected.

(i) The unit price shall be inserted on the 025 Unit Pricing Form in the "UNIT BID PRICE" column. Extensions, which are the unit prices multiplied by the approximate quantities for each item, shall be inserted in figures in the amount column. Offers shall be submitted only on the City's 025 Unit Pricing Form or approved computer printout sheets. Offers not so submitted will be considered nonresponsive. Conditional offers or unbalanced offers will be considered nonresponsive.

(j) Separated Contract: This project will be offered as a "separated contract" in accordance with a recent amendment to section 151.311 of the tax code in order for the contractor to claim a tax exemption on the contract price of materials.

4. SUBMISSION OF OFFERS

(a) Respondent's Offer shall be enclosed in a sealed envelope addressed to the **City Clerk, City of San Antonio, 100 Military Plaza, San Antonio, Texas,** as set forth in the Invitation for Bid (IFB) or Request for Competitive Sealed Proposals (RFCSP). The name and address of Respondent, the date and hour of the offer/bid opening and the title of the offer solicitation shall be placed on the outside of the envelope.

(b) Information and solicitation documents are obtainable from the Consultant as set forth in the published IFB/RFCSP. Solicitation documents are also on file in the office of Planning and Development Division, Aviation Department, 457 Sandau Road, San Antonio, Texas 78216, or online at the following web address: http://epay.sanantonio.gov/RFPListings/RFPList.aspx

(c) Offers must be submitted on the forms furnished. Offers, however, may be modified provided such modifications are sealed and received by the City Clerk prior to the submission deadline.

(d) By submittal of this offer, Respondent certifies to the best of his/her knowledge that all information is true and correct.

5. REJECTION OF OFFERS

(a) The City may reject an offer if:

1. The Respondent misstates or conceals any material fact in the offer; or

2. The offer does not strictly conform to law or the requirements of the offer;

3. The offer is conditional.

4. The Respondent is deemed by the City to be unqualified based on the information supplied.

5. The Respondent has exceeded its bonding capacity.

6. The offer is unbalanced.

7. Subcontractor/Supplier Utilization Plan and City of San Antonio Subcontractor/Supplier Letter of Intent for Contracts Utilizing Small Contract Goals is not submitted with bid, if applicable.

(b) In the event that a Respondent is or subsequently becomes delinquent in the payment of his, her or its City taxes, including state and local sales taxes, such fact shall constitute grounds for rejection of the offer or if awarded the offer, for cancellation of the contract. The City reserves the right to deduct any delinquent taxes from payments that the City may owe to the delinquent Respondent as a result of such contract.

(c) The City may, however, reject all offers whenever it is deemed in the best interest of the City to do so, and may reject any part of a offer unless the offer has been qualified as provided in 5(a)3 above.

(d) The City at its sole discretion may also waive any minor informalities or irregularities in any offer, to include failure to submit sufficient offer copies, failure to submit literature or similar attachments, or business affiliation information.

6. WITHDRAWAL OF OFFERS

Offers may not be withdrawn after the time set for the offer opening, unless approved by the City.

7. LATE OFFERS OR MODIFICATIONS

(a) Offers and modifications received after the time set for the offer opening (solicitation deadline) will not be considered.

(b) Proposal amounts may not be amended or modified in any manner after the Solicitation Deadline in the published IFB/IFCSP, except as hereinafter provided.

(c) The City will perform a cursory review to determine if the offers are complete as to required contents, in proper form, and are properly signed. An offer that is obviously defective will not be read aloud at the bid/offer opening, nor will the offer prices included therein be publicly revealed. If a minor clerical error or omission is discovered and classified by the City as a technicality which the City of San Antonio has reserved the right to waive, or applicable law allows the City a right to waive, the Respondent's representative shall have the opportunity to make the appropriate correction.

8. PROPOSAL GUARANTY:

(a) Each Offer Proposal must be accompanied by a certified or cashier's check (if the offer is less than $25,000) or an original Bid/Offer/Proposal Bond issued by a corporate surety company licensed to conduct business in the State of Texas, in the amount of not less than five percent (5%) of the greatest total amount of the Offer/Bid/Proposal, payable without recourse to the order of the City of San Antonio, Texas. These forms of security will serve as a guarantee that, if awarded the Contract, the Respondent will promptly enter into Agreement with the City as required by the Contract Documents and execute Performance and Payment Bonds on the City forms provided.

(b) Termination of Offer: No Offer shall be withdrawn or terminated by Respondent without consent of the City for a period of ninety (90) calendar days after the solicitation deadline.

(c) Should the successful Respondent fail to execute the Contract and Bonds and provide the required insurance within twenty (20) calendar days after the date of transmittal of the Contract Documents by City to Contractor, said Proposal Guaranty shall become the property of the City, not as a penalty, but as liquidated delay and administrative damages suffered by the City as a result of the successful Respondent failing to enter into the awarded City Contract.

(d) Proposal guarantees of the first-, second- and third-ranked respondents (for IFCSP) or first-, second- and third-lowest bidders (for IFB) will be retained until after the Contract Agreement and Bonds have been executed. Proposal guarantees in the form of any certified or cashier's check of all except the three above-referenced Respondents will be returned by mail to unsuccessful Respondents upon certification of the three above-referenced respondents, unless there is a justifiable reason for City to hold them for the full ninety (90) calendar day period.

9. QUALIFICATIONS OF RESPONDENT:

(a) The City or its agents may make such investigations as it deems necessary to determine the ability and responsibility of the Respondent to perform the Work. Respondent shall furnish to the City reasonable information and data for this purpose as the City may reasonably request. The City reserves the right to reject any offer if the evidence submitted by, or investigation of, such Respondent fails to satisfy the City that such Respondent is responsible to carry out the obligations of the Contract and to complete the Work contemplated therein.

(b) The City has implemented a Contractor performance evaluation system. The evaluation will cover accomplishment of the Project with adequate manpower; ability to meet schedule; adequacy of materials and equipment; citizen complaint response; adjacent-to-project property owner relations; and attendance at public project meetings. The Contractor's evaluation history may also be used by the City Staff as a basis for recommendations of award to the City Council.

10. AWARD OF CONTRACT

(a) For Invitation for Bids, the contract will be awarded to the lowest responsible Respondent whose offer, conforming to the Invitation for Bids, is most advantageous to the city.

(b) For Request for Competitive Sealed Proposals, the contract will be awarded to the Respondent whose offer, conforming to Request for Competitive Sealed Proposals, is most advantageous to the City.

(c) **A written award of acceptance (manifested by a City Ordinance) and appropriation (evidenced by Purchase Order) mailed or otherwise furnished to the successful Respondent may result in a binding contract without further action by either party.**

(d) Breaking of tie offers shall be in accordance with V.T.C.A. Local Government Code §271.901.

(e) The City reserves the right to accept any items or groups of items on this offer, unless the Respondent qualifies his/her offer by specific limitations (Re: Par. 5(a)(3) above).

(f) Although the information furnished to Respondents specified the approximate quantities needed, based on the best available information where a contract is let on a unit price basis, payment shall be based on the actual quantities supplied. The City reserves the right to delete items, prior to the awarding of the contract, and purchase said items by other means; or after the awarding of the contract, to increase or decrease the quantities offer in accordance with §252.048 of the Texas Local Government Code**.** No changes shall be made without written notification of the City.

(g) Effective January 1, 2006, Chapter 176 of the Texas Local Government Code requires that persons, or their agents, who seek to contract for the sale or purchase of property, goods, or services with the City, shall file a completed conflict of interest questionnaire with the City Clerk not later than the 7th business day after the date that the person: (1) begins contract discussions or negotiations with the City; or (2) submits to the City an application, response to a request for proposals, offers, correspondence, or another writing related to a potential agreement with the City. The conflict of interest questionnaire form is available from the Texas Ethics Commission at http://www.ethics.state.tx.us/whatsnew/conflict_forms.htm. Completed conflict of interest questionnaires may delivered by hand to the Office of the City Clerk at City Hall, 2nd floor, 100 Military Plaza, San Antonio, TX 78205. Completed conflict of interest questionnaires may be mailed to the Office of the City Clerk, P.O. Box 839966, San Antonio, TX 78283-3966. If delivering a completed conflict of interest questionnaire, deliver to: Office of the City Clerk,. Please consult your own legal advisor if you have questions regarding the statute or form.

11. SITE INVESTIGATION

(a) The submittal of an Offer by Respondent shall constitute an admission that the Respondent has fully examined the location of the proposed Work and the requirements of the Work. The Respondent shall be familiar with all of the Contract Documents and other City instructions including Respondent's ability to submit inquiries to City and Design Consultant before submitting an Offer so that no Contractor misunderstanding shall exist regarding the nature and character of the Work to be performed. No allowance will be made by City for any Respondent claim that the Offer/Proposal/Bid is based upon incomplete information as to the nature and character of the site or the Work involved.

(a) (b) After investigating the Project site and comparing the Plans and Specifications and other Contract Documents with the existing conditions, the prospective Respondent should immediately notify the Consultant of any conditions for which the requirements of labor and materials are not clear, and pose any question regarding the quantity and extent of the Work involved. Respondent inquiry notifications to the City and/or Consultant must be made in writing at least five (5) calendar days prior to the scheduled solicitation deadline.

(b) (c) It is understood and acknowledged by Respondent that full and complete allowance for conditions under which the Contractor will be required to perform construction, or that will in any manner affect Work under this Contract, are included in the Respondent's Proposal and reflected in the proposed Contract sum. If a soils investigation was conducted as a potential

aid to the Consultant in preparation of the Contract Plans and Specifications, this information is available to prospective respondents for review at the Project Consultant's office. Copies may be purchased from the Consultant and is non-refundable. THIS INFORMATION IS AVAILABLE TO PROSPECTIVE RESPONDENTS WITHOUT EXPRESS OR IMPLIED REPRESENTATION, ASSURANCE, WARRANTY OR GUARANTEE BY CITY OR CONSULTANT THAT IT IS COMPLETE OR CORRECT OR THAT IT REPRESENTS A TRUE, OR APPROXIMATELY TRUE, PICTURE OF THE SUB-SURFACE CONDITIONS TO BE ENCOUNTERED ACROSS THE PROPOSED WORK SITE. THIS INFORMATION IS SPECIFICALLY NOT PART OF THE CONTRACT DOCUMENTS. Before submitting its Offer, each Respondent may, at Respondent's own expense, make reasonable work site investigations and tests as the Respondent may deem necessary to determine his Offer for performance of the Work in accordance with the Contract Documents. Access for such investigations and tests must be reasonably coordinated with the City.

12. RESTRICTION ON COMMUNICATION

Respondents are prohibited from communicating with City staff and City officials regarding this solicitation with the following exceptions:

(a) Questions or other communication at the pre-submittal conference are allowed.

(b) Written questions and comments concerning this solicitation shall be sent to the consultant, Mr. Mike Norby, P.E., 601 NW Loop 410, Suite 350, San Antonio, Texas 78216-5595, Tel: 210-541-9166, email address: mike.norby@kimley-horn.com. and a copy to Mr. Kao-Lin Chen, PE, the City's Aviation Department, Planning and Development Division at 457 Sandau Road, San Antonio, Texas 78216., Tel: 210-207-3506 and email address: kaolin.chen@sanantonio.gov. These questions must be received no later than one week prior to submittal date.

(c) Respondent and/or their agents may contact the Aviation Department's DBE Liaison Officer for assistance or clarification with issues specifically related to the DBE policy and/or completion of the required DBE forms. Point of contact is Ms. Lisa Brice, who may be reached via telephone at **(210) 207-3505** or through e-mail at **lisa.brice@sanantonio.gov**. Respondents and/or their agents may contract Ms. Brice at any time prior to the due date for submission of response. Contacting her or her offices regarding this solicitation after the due date is not permitted.

Answers by Consultant and/or City will be given in writing to all prospective Respondents in Addendum form. All provisions and requirements of such addenda will supersede or modify affected portions of the Project Plans and/or Specifications. All addenda will be incorporated in and bound with the Contract documents. No other explanation or interpretation will be considered official or binding upon the City. All addenda will be posted on the City's website with this solicitation. It is respondent's responsibility to obtain addenda.

Violation of this provision by Respondent or his or her agent may lead to disqualification of its offer from consideration.

060 SUPPLEMENTAL CONDITIONS

1. When submitting a bid in person, visitors to City Hall must allow time for security measures. Visitors to City Hall will be required to enter through the east side of the building. The public will pass through a metal detector and x- ray machine located in the lobby. All packages, purses and carried items will be scanned during regular business hours of 7 a.m. to 7 p.m.

After the public proceeds through the metal detector, they will sign in and receive a visitor's badge. For those that might require the use of a ramp, entry is available on the south side of the building (Dolorosa side). Security will meet the visitor in the basement with a hand scanner.

2. Scope of the Work - The Contractor shall furnish all the materials and perform all the Work called for in the Contract Documents and more specifically described in the Plans and Specification for the Project entitled "**Runway 12R-30L Rehabilitation and Terminal Area Taxiway Improvements (Package 1)"**.

3. The Contractor shall begin Work at the job site within seven (7) calendar days after the date of the Owner's written Authorization to Proceed issued by the Owner's Representative.

4. Liquidated Damages for Delay in Substantial Completion & Final Completion: Contractor shall pay Owner the sum indicated on the table below for each and every calendar day of unexcused delay in achieving Substantial Completion/Final Completion beyond the Scheduled Completion/Final Completion Dates. Any sums due and payable hereunder by Contractor shall be payable, not as a penalty, but as Liquidated Damages representing an estimate of delay damages likely to be sustained by Owner, estimated at the time of executing the Contract. Such Liquidated Damages shall apply regardless of whether Contractor has been terminated by Owner prior to Substantial Completion, so long as Contractor's actions or inactions contributed to the delay. Such Liquidated Damages shall be in addition to and not in preclusion of any recovery of actual damages resulting from other defects in Contractor's performance hereunder for matters other than delays in Substantial Completion/Final Completion. When Owner reasonably believes that Substantial Completion/Final Completion will be inexcusably delayed, Owner shall be entitled, but not required, to withhold from any amounts otherwise due to Contractor an amount then believed by Owner to be adequate to recover liquidated damages applicable to such delays. If and when Contractor overcomes the delay in achieving Substantial Completion/Final Completion, or any part thereof, for which Owner has withheld payment, Owner promptly shall release to Contractor those funds withheld but no longer applicable as Liquidated Damages.

Liquidated Damages

Contractual Milestone No.	Contractual Milestone Description and Requirements	From	Duration	Liquidated Damages
1	Base Bid - Phase (Runway Closure): Substantial Completion of Repair Runway12R "Hump" Location, Repair Runway 30L – Shattered Slabs, Construct Taxiway W to the limits of the Runway Safety Area	Coordinated Start Date; Cannot Start Before April 1.	90 Calendar Days	$7,500.00 per day
2	Phase 1A and 1B: Substantial Completion of Widen Inner Taxilane	Notice to Proceed	80 Calendar Days	$5,000.00 per day
3	Phase 2: Substantial Completion of •Construct Taxiway Connector G2 and a portion of Taxiway G	Substantial Completion of Phase 1A and 1B	45 Calendar days	$5,000.00 per day
4	Phase 3: Substantial Completion of •Construct Taxiway Connector G1 and a portion of Taxiway G	Substantial Completion of Phase 2	45 Calendar days	$5,000.00 per day
5	Phase 4: Substantial Completion of •Construct Taxiway Connector G3 and a portion of Taxiway G	Substantial Completion of Phase 3	40 Calendar days	$5,000.00 per day
6	Phase 5A and 5B: Substantial Completion of •Construct Remaining portion of Taxiway W Install Shoulders along Taxiway G Construct A portion of Taxiway G Taxiway W Island	Substantial Completion of Phase 4	50 Calendar days	$5,000.00 per day
7	Final Completion	Final Completion of all Phases.	30 Calendar days	$2,100.00 per day

5. The Contract Sum - The Owner shall pay the Contractor for the proper performance of the Contract, subject to additions and deduction provided therein, the Contract sum is listed in the Purchase Order and actual quantities delivered and used for construction.

6. Partial Payment - Each month, the Owner shall make a progress payment as approved by the Owner's Representative in accordance with the General Conditions.

7. Acceptance and Final Payment - Final Payment shall be due on final Owner acceptance of the Project Work, provided the Contract has been completed by Contractor as provided in the General Conditions.

8. Substantial Completion and Final Completion are defined in Articles 9.7 and 9.9 of the General Conditions.

Before issuance of the final payment, the Contractor shall submit an affidavit and reasonable additional supporting evidence if required, as satisfactory to the Director of Finance, City of San Antonio, that all labor payrolls, construction materials and supply bills, subcontractors, and other indebtedness connected with the Work have been paid in full, or that an outstanding debt is being disputed and that the corporate surety or its agent is processing the outstanding claim and is willing to defend and/or indemnify the City should the City make final Contract payment.

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PERFORMANCE BOND

STATE OF TEXAS)
COUNTY OF BEXAR) Know all men by these presents:
CITY OF SAN ANTONIO)

1. That we_____,

as Principal, and _____,
as Sureties, do hereby acknowledge ourselves to be held and firmly bound unto the City of San Antonio, a municipal corporation of the County of Bexar and State of Texas in the sum of $_____ for payment of which sum well and truly to be made in and unto said City of San Antonio, we do hereby bind and obligate ourselves, our heirs, executors, administrators, assigns, and successors, jointly and severally:

2. THE CONDITIONS OF THIS BOND, HOWEVER, ARE SUCH THAT WHEREAS, the said

_____

hereinafter called Contractor or Principal, has made and does this day make and enter into a certain contract in writing with said City of San Antonio, for the construction and completion for said City of certain structures, work and improvements generally described as

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)
at San Antonio International Airport

and for the performance and observance of diverse other matters and things in connection with said work; all as more fully described in said contract and its included instruments which are expressly made a part of this obligation.

3. NOW THEREFORE, if Contractor, the principal party to this obligation shall faithfully construct and complete said structures, work and improvements, and shall observe, perform and comply with all the terms, conditions, stipulations, undertakings and provisions of said contract and all included instruments, according to their intent and purpose insofar as the same relate to or are incident to the construction and completion of said structures, work and improvements then and thereupon this obligation shall be and become null and void, but otherwise to remain in full force and effect; and it is hereby further understood and agreed that this bond shall be a continuous obligation against the principal and each member of said principal party hereto, and each and all sureties hereon, and that successive recoveries may be had hereon for each and every breach of this bond until the full amount thereof shall have been exhausted; and the liability of the sureties on this bond shall not be in any manner released or diminished by any changes in the work which may be authorized or directed by the City, nor by the exercise or failure to exercise by or on behalf of the City any right or remedy provided by the contract or specifications or by any law or ordinance.

4. It is further understood that this obligation is incurred pursuant to Chapter 2253 of the Texas Government Code as amended, and all liabilities on this bond shall be determined in accordance with the provisions of said Chapter to the same extent as if it were copied at length herein.

5. IN TESTIMONY WHEREOF, witness our hands and the seal of any incorporated surety hereon this _____day of _____ A.D. 20 _____.

_____
(Contractor)

By:_____
(Typed Name) _____

_____
(Surety)

By:_____
(SEAL) (Typed Name) _____

_____
_____
Address of Surety for Service Purposes

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PAYMENT BOND

STATE OF TEXAS)
COUNTY OF BEXAR) Know all men by these presents:
CITY OF SAN ANTONIO)

1. That we _____,

as Principal, and _____
as Sureties, do hereby acknowledge ourselves to be held and firmly bound unto the City of San Antonio, a municipal corporation of the County of Bexar and State of Texas in the sum of $ _____ for payment of which sum well and truly to be made in and unto said City of San Antonio, we do hereby bind and obligate ourselves, our heirs, executors, administrators, assigns, and successors, jointly and severally:

2. THE CONDITIONS OF THIS BOND, HOWEVER, ARE SUCH THAT WHEREAS, the said

_____

hereinafter called Contractor or Principal, has made and does this day make and enter into a certain contract in writing with said City of San Antonio, for the construction and completion for said City of certain structures, work and improvements generally described as

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)
at San Antonio International Airport

and for the performance and observance of diverse other matters and things in connection with said work, and, interalia, therein entered into covenants and agreements to promptly pay all persons supplying labor, materials and services in the prosecution of the work provided for in said contract; all as more fully described in said contract and its included instruments which are expressly made a part of this obligation;

3. NOW THEREFORE, if Contractor, the Principal party to this obligation shall promptly make payment to all persons supplying labor and materials in the prosecution of the work provided for in said contract, and any and all duly authorized modifications of said contract that may hereafter be made, notice of which modifications to the surety being hereby waived, then this obligation shall be and become null and void, but otherwise to remain in full force and effect: and it is hereby further understood and agreed that this bond shall be a continuous obligation against the principal and each member of said principal party hereto, and each and all sureties hereon, and that successive recoveries may be had thereon for each and every breach of this bond until the full amount thereof shall have been exhausted; and the liability of the sureties on this bond shall not be in any manner released or diminished by any changes in the work which may be authorized or directed by the City, nor by the exercise or failure to exercise by or on behalf of the City any right or remedy provided by the contract or specifications or by any law or ordinances.

4. It is further understood that this obligation is incurred pursuant to Chapter 2253 of the Texas Government Code, and that this obligation is for the benefit and sole protection of all persons supplying labor and materials in the prosecution of said contract.

5. IN TESTIMONY WHEREOF, witness our hands and the seal of any incorporated surety hereon this _____ day of _____ A.D. 20 _____.

_____
(Contractor)

By: _____
(Typed Name) _____

_____
(Surety)

By: _____
(SEAL) (Typed Name) _____

_____
_____
Address of Surety for Service Purposes

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ATTACHMENT 1
SAN ANTONIO INTERNATIONAL AIRPORT (SAIA)
DBE GOOD FAITH EFFORT PLAN FOR
FEDERALLY ASSISTED CONSTRUCTION CONTRACTS

NAME OF PROJECT: _____

SECTION A - BIDDER INFORMATION:

Name of Firm: _____

Address: _____

City _____ State: _____ Zip: _____

Contact Person: _____ Telephone: _____

Email Address: _____

Age of Firm (Number of Years in Business): _____ Years

Annual Gross Receipts of the Firm: _____ Less than $500,000 _____ $500,000 to $1 million
_____ $1 million to $2 million _____ $2 million to $5 million
_____ Over $5 million

Is your firm Certified: Yes _____ No: _____ If certified, Certification Number: _____

Type of Certification _____ DBE _____ MBE _____ WBE _____ AABE _____ SBE

1. List **ALL SUBCONTRACTORS/SUPPLIERS** that will be utilized on this contract. A Letter of Intent (DBE Form 2) must be submitted for all subcontractors/suppliers listed below within seven (7) business days from the bid date.

Name & Address of Company	Scope of Work/Supplies to be Performed/Provided by Firm	Estimated Contract Amount	If Firm is DBE Certified, Provide Certification Number
1.			
2			
3.			
4.			
5.			
6.			
7.			

(Use Additional Sheets if Necessary)

SECTION B – DBE COMMITMENTS

The DBE goal on this project is: _____%

1. The undersigned bidder has satisfied the requirements of the bid specification in the following manner (please check the appropriate space:

   _____ The bidder/offeror is committed to a minimum of _____ % DBE utilization on this contract.

   _____ The bidder/offeror (if unable to meet the DBE goal of _____%) is committed to a minimum of _____% DBE utilization on this contract. *(If contractor is unable to meet the goal, please fill out Section C and submit documentation demonstrating good faith efforts).*

2. Name and phone number of person appointed to coordinate and administer the Federal DBE requirements on this project.

   Name: _____

   Title: _____

   Phone Number: _____

IF DBE GOAL WAS MET, PROCEED TO PAGE 4 AND SIGN THE GFEP. IF GOAL WAS NOT MET, PROCEED TO SECTION C.

SECTION C – GOOD FAITH EFFORTS (Fill out only, if the DBE goal was not achieved).

1. List all firms you contacted with subcontracting/supply opportunities for this project that will not be utilized for this contact by choice of the bidder, subcontractor, or supplier. ***Written notices to firms contacted by the bidder for specific scopes of work identified for subcontracting/supply opportunities must be provided to subcontractor/supplier not less than five (5) business days prior to bid/proposal due date.*** The following information is required for all firms that were contacted of subcontracting/supply opportunities:

Name & Address of Company	Scope of Work/Supplies to be Performed/ Provided by Firm	If Firm is DBE Certified, Provide Certification Number	Date Written Notice Was Sent and Method (Letter, Fax, E-mail)	Reason Agreement Was Not Reached
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

(Use additional sheets as needed)

In order to verify a bidder's good faith efforts, please provide to the City with copies of the written notices to all firms contacted by the bidder for specific scopes of work identified in relation to the subcontracting/supply opportunities in the above named project. Copies of said notices must be provided to the DBE Liaison within five (5) business days after the bid is due. Such notices shall include information on the plans, specifications and scope of work.

2. Did you attend the pre-bid conference scheduled by the City for this project? ☐ Yes ☐ No

3. List all DBE listings or directories, contractor associations, and/or any other associations utilized to solicit DBE subcontractors/suppliers:

4. Discuss efforts made to define additional elements of the work proposed to be performed by DBEs in order to increase the likelihood of achieving the goal: _____

_____

_____

5. Indicate advertisement mediums used for soliciting bids from DBEs. (Please attach a copy of the advertisement(s): _____

_____

_____

6. Discuss efforts made to assist interested DBEs in obtaining bonding, lines of credit, or insurance: _____

_____

_____

7. Discuss efforts made to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services: _____

_____

AFFIRMATION

I HEREBY AFFIRM THAT THE ABOVE INFORMATION IS TRUE AND COMPLETE TO THE BEST OF MY KNOWLEDGE. I FURTHER UNDERSTAND AND AGREE THAT, THIS DOCUMENT SHALL BE ATTACHED THERETO AND BECOME A BINDING PART OF THE CONTRACT.

NAME AND TITLE OF AUTHORIZED OFFICIAL: _____

SIGNATURE: _____ DATE: _____

NOTE:

1. If the DBE goal was not met, the Aviation's DBE Liaison Officer will evaluate the "good faith efforts" of a firm. The Good Faith Effort Plan for Federally Funded Contracts must be approved by the Aviation Department's DBE Liaison Officer prior to award of contract.

2. If the DBE Liaison determines that the bidder has not made good faith efforts, then the bidder shall have the opportunity to appeal this decision to the Aviation Director. The Aviation Director shall review the written documentation presented by bidder and determine whether bidder has adequately documented good faith efforts. If the Aviation Director determines that the bidder did not make good faith efforts to meet the goal, this final decision is not administratively appealable to the Department of Transportation.

FOR SAN ANTONIO INTERNATIONAL AIRPORT USE ONLY:

Plan Reviewed by: _____ Date: _____
Signature of DBE Liaison

Recommendation: Approval: _____ Denial: _____

ATTACHMENT 3
SAN ANTONIO INTERNATIONAL AIRPORT (SAIA)
LETTER OF INTENT
FOR FEDERALLY FUNDED CONTRACTS

The requirements of 49 CFR Part 26 (Section 26.53), of the U.S. Department of Transportation, requires that all bidders/proposers comply with good faith efforts requirements as a matter of responsiveness. Each solicitation for which a contract goal has been established will require the bidders/proposers to submit the following information from each Subcontractor/Supplier for this contract], and/or change or addition of subcontractors/suppliers on federally funded contracts (ACDBE Form 3)

NAME OF PROJECT: _____

Name of bidder/proposer's firm: _____

Address: _____ Phone No.: _____

City: _____ State: _____ Zip: _____

Contact Person: _____ Telephone: _____

Name of Sub consultant/Supplier: _____

Address: _____

City: _____ State: _____ Zip: _____

Telephone: _____ Contact Person: _____

Is the above firm Certified: ☐ Yes ☐ No If certified, Certification No: _____

Type of Certification: ☐ DBE ☐ MBE ☐ WBE ☐ AABE ☐ SBE

If firm is certified, please attach a copy of the Certification Affidavit with this form.

Age of Firm (Number of Years in Business: _____Years

Annual Gross Receipts of the Firm: ☐ Less than $500,000 ☐ $500,000 to $1 million
☐ $1 million to $2 million ☐ $2 million to $5 million
☐ Over $5 million

NAICS Code and/or Description of work to be performed by firm:

_____

_____

_____

The bidder/proposer is committed to utilizing the above-named firm for the work described above. The estimated dollar value of this work is $ _____.

Affirmation

The above named firm affirms that it will perform the portion of the contract for the estimated dollar value as stated above.

By: _____ _____
Signature of Firm's Representative Date

Title: _____

NAME OF PROJECT: _____

DECLARATION OF PRIME CONSULTANT:

I hereby declare and affirm that I am the _____
(Title of Declarant)

and a duly authorized representative of _____
(Name of Prime Consultant)

to make this declaration and that I have personally reviewed the material and facts set forth in this Intent to Perform form. To the best of my knowledge, information and belief, the facts ad representations contained in this form are true, the owner or authorized agent of the firm signed this form in the place indicated, and no material facts have been omitted.

The undersigned intends to enter into a formal agreement with the listed firm for work as indicated by this form and will, if requested, provide the Airport's DBE Liaison with a copy of that agreement within three (3) business days of execution.

_____
(Name of Declarant)

_____ _____
(Signature) (Date)

SUBMIT THIS PAGE FOR EACH SUBCONSULTANT/SUPPLIER FOR THIS CONTRACT, AS LISTED ON ITEM 1 OF DBE GOOD FAITH EFFORT PLAN FOR FEDERALLY FUNDED CONTRACTS [DBE FORM 1] AND/OR CHANGE OR ADDITION OF SUBCONTRACTORS/SUPPLIERS ON FEDERALLY FUNDED CONTRACTS (DBE FORM 3)

IF THE BIDDER/OFFEROR DOES NOT RECEIVE AWARD OF THE PRIME CONTRACT, ANY AND ALL REPRESENTATIONS IN THIS LETTER OF INTENT AND AFFIRMATION SHALL BE NULL AND VOID.

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GENERAL CONDITIONS FOR
CITY OF SAN ANTONIO CONSTRUCTION CONTRACTS

TABLE OF CONTENTS

GENERAL CONDITIONS FOR
CITY OF SAN ANTONIO CONSTRUCTION CONTRACTS

ARTICLE I. GENERAL PROVISIONS

1.1 CONTRACT DEFINITIONS

Wherever used in the Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated, which are applicable to both the singular and plural thereof.

1.1.1 **"ALTERNATE"** means a variation in the Work in which Owner requires a price separate from the Base Bid. If an Alternate is accepted by Owner, the variation will become a part of the Contract through award of the Contract and the Base Bid will be adjusted to include the amount quoted as stated in the Notice of Award to Contractor. If an Alternate is accepted by Owner, and later deleted, Owner will be entitled to a credit in the full value of the Alternate as priced in Contractor's Bid Proposal.

1.1.2 **"AMENDMENT"** is a written modification of the Contract prepared by Owner or Design Consultant and signed by Owner and Contractor, (and approved by the San Antonio City Council, if required) which authorizes an addition, deletion or revision in the Work (specifically the services) or an adjustment in the Contract Sum or the Contract Times and is issued on or after the Effective Date of the Agreement.

1.1.3 **"BASE BID"** is the price quoted for the Work before Alternates are considered.

1.1.4 **"CHANGE ORDER"** refer to **Article VII** herein for definition.

1.1.5 **"CITY COUNCIL"** means the duly elected members of the City Council of the City of San Antonio, Texas.

1.1.6 **"CONSTRUCTION OBSERVER/INSPECTOR** (hereafter referred to as "COI") is the authorized representative of the Director of Capital Improvements Management Services (hereafter referred to as "CIMS"), or its designee department, assigned by Owner to observe and inspect any or all parts of the Project and the materials to be used therein. Also referred to herein as Resident Inspector.

1.1.7 **"CONTRACT"** means the Contract Documents which represent the entire and integrated agreement between Owner and Contractor and supersede all prior negotiations, representations or agreements, either written or oral. The terms and conditions of the Contract Documents may be changed only in writing by a Field Work Directive, Change Order or Amendment. The Contract Documents shall not be construed to create a contractual relationship of any kind between:

(1) Design Consultant and Contractor;

(2) Owner and a Subcontractor or Sub-Subcontractor; or

(3) any persons or entities other than Owner and Contractor.

1.1.8 **"CONTRACT DOCUMENTS"** means the Construction Contract between Owner and Contractor, which consists of, but are not limited to, the following: the Notice of Award, an enabling City of San Antonio Ordinance, the solicitation documents and other contract-related documents, which include:

(1) General Conditions;

(2) Vertical and/or Horizontal specific General Conditions and Special Conditions included by Special Provisions or addenda;

(3) Drawings;

(4) Specifications;

(5) addenda issued prior to the close of the solicitation period; and

(6) other documents listed in the Contract, including Field Work Directives, Change Orders and/or Amendments;

(7) a written order for a minor change in the Work issued by Design Consultant and/or Owner, as described in **Article VII** herein.

The geotechnical and subsurface reports which Owner may have provided to Contractor specifically are excluded from the Contract Documents.

1.1.9 **"CONTRACT TIME"** means, unless otherwise provided, the period of time, including any authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work. When the plural ("Contract Times") is used, it refers to milestones designated in the Work Progress Schedule.

1.1.10 **"CONTRACTOR"** means the entity that has entered into a Contract with Owner to complete the Work. Contractor, as used herein, includes Construction Manager at Risk or other applicable entities performing work under a Contract with City.

1.1.11 **"DAY"** as used in the Contract Documents shall mean Calendar Day, unless otherwise specifically defined. A Calendar Day is a day of 24 hours, measured from midnight to the next midnight, unless otherwise specifically stipulated. A Working Day is a day of eleven hours, as measured from seven o'clock a.m. to six o'clock p.m. on weekdays, except legal holidays, or the hours during which Contractor has been authorized to work by Owner.

1.1.12 **"DEPARTMENT"** means the Department of Capital Improvements Management Services (hereafter referred to as "CIMS"), City of San Antonio, Texas or Director of the Department of Capital Improvements Management Services.

1.1.13 **"DESIGN CONSULTANT"** unless the context clearly indicates otherwise, means an Engineer, Architect or other Design Consultant in private practice, licensed to do work in Texas and retained for a specific project under a contractual agreement with Owner.

1.1.14 **"DRAWINGS"** (also referred to herein as **"Plans"**) are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of Work, generally including elevations, sections, details, schedules and diagrams.

1.1.15 **"FIELD WORK DIRECTIVES" OR "FORCE ACCOUNT"** is a written order signed by Owner directing a change in the Work prior to agreement an adjustment, if any, in the Contract Sum and/or Contract, as further defined in **Section 7.3** herein.

1.1.16 **"HAZARDOUS SUBSTANCE"** is defined to include the following:

(a) any asbestos or any material which contains any hydrated mineral silicate, including chrysolite, amosite, crocidolite, tremolite, anthophylite or actinolite, whether friable or non-friable;

(b) any polychlorinated biphenyls ("PCBs"), or PCB-containing materials, or fluids;

(c) radon;

(d) any other hazardous, radioactive, toxic or noxious substance, material, pollutant, or solid, liquid or gaseous waste; any pollutant or contaminant (including but not limited to petroleum, petroleum hydrocarbons, petroleum products, crude oil or any fractions thereof, any oil or gas exploration or production waste, any natural gas, synthetic gas or any mixture thereof, lead, or other toxic metals) which in its condition, concentration or area of release could have a significant effect on human health, the environment, or natural resources;

(e) any substance that, whether by its nature or its use, is subject to regulation or requires environmental investigation, monitoring, or remediation under any federal, state, or local environmental laws, rules, or regulations;

(f) any underground storage tanks, as defined in 42 U.S.C. Section 6991(1)(A)(I) (including those defined by Section 9001(1) of the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act, 42 U.S.C. Section 6901 et seq.;

(g) the Texas Water Code Annotated Section 26.344; and Title 30 of the Texas Administrative Code Sections 334.3 and 334.4), whether empty, filled or partially filled with any substance; and

(h) any other hazardous material, hazardous waste, hazardous substance, solid waste, and toxic substance as those or similar terms are defined under any federal, state, or local environmental laws, rules, or regulations.

1.1.17 **"NOTICE TO PROCEED (HEREIN ALSO REFERRED TO AS "WORK PROJECT AUTHORIZATION" OR "NTP")"** is a written notice given by Owner to Contractor establishing the date on which the Contract Time will commence to run and the date on which Contractor may begin performance of its contractual obligations.

1.1.18 **"OWNER"** is defined in **Article II** herein.

1.1.19 **"OWNER DESIGNATED REPRESENTATIVE (ODR)"** means the person(s) designated by Owner to act for Owner.

1.1.20 **"PROJECT"** means the total design and construction of Work performed under the Contract Documents and may be the whole or a part of the Project and which may include construction by Owner or by separate contractors. All references in these General Conditions to or concerning the Work or the Site of the Work will use the term "Project," notwithstanding that the Work only may be a part of the Project.

1.1.21 **"PROJECT MANAGEMENT TEAM"** is composed of Owner, its representatives, Design Consultant and Program Manager (if any) for this Work.

1.1.22 **"SITE"** means the land(s) or area(s) (as indicated in the Contract Documents) furnished by Owner, upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.

1.1.23 **"SPECIAL CONDITIONS"** are terms and conditions to an Agreement that supplement and are superior to these General Conditions and grant greater authority or impose greater restrictions upon Contractor, beyond those granted or imposed in these General Conditions. City's Horizontal Special Conditions are attached hereto, made a part of these General Conditions and shall be used as applicable.

1.1.24 **"SPECIFICATIONS"** are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards,

workmanship for the Work, performance of related services and other technical requirements.

1.1.25 **"SUBSTANTIAL COMPLETION"** is the date certified by Owner and Design Consultant, in accordance with **Section 9.8** herein, when the Work, or a designated portion thereof, is sufficiently complete in accordance with the Contract Documents so as to be operational and fit for the intended use by Owner.

1.1.26 **"TEMPORARY BENCH MARKS (TBM)"** are temporary affixed marks which establish the exact elevation of a place; TBMs are used by surveyors in measuring site elevations or as a starting point for surveys.

1.1.27 **"THE 3D MODEL"** is the Building Information Model prepared by Design Consultant in the format designated, approved and acceptable to Owner with databases of materials, products and systems that can be used by Contractor to prepare schedules for cost estimating, product and materials placement schedules and evaluations of crash incidences. The 3D Model, if available, may be used as a tool, however all information taken from the Model is the responsibility of Contractor and not Owner or Design Consultant.

1.1.28 **"WORK"** means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment and services provided or to be provided by Contractor, or any Subcontractors, Sub-Subcontractors, material suppliers or any other entities for which Contractor is responsible, to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project**.**

1.1.29 **OTHER DEFINITIONS.** As used in the Contract Documents, the following additional terms have the following meanings:

1.1.29.1 "provide" means to furnish, install, fabricate, deliver and erect, including all services, materials, appurtenances and all other expenses necessary to complete in place and ready for operation or use;

1.1.29.2 "shall" means the mandatory action of the party of which reference is being made;

1.1.29.3 "as required" means as prescribed in the Contract Documents; and

1.1.29.4 "as necessary" means all action essential or needed to complete the work in accordance with the Contract Documents and applicable laws, ordinances, construction codes and regulations.

1.2 PRELIMINARY MATTERS

1.2.1 Upon the San Antonio City Council's passing of an Ordinance authorizing the issuance of a contract, a Notice of Award Letter will be sent to Contractor by CIMS Contract Services, notifying Contractor of the award of a contract. In its Notice of Award Letter, Contractor will be informed of a date certain by which Contractor's bond(s) and evidence of insurance shall be delivered to CIMS Contract Services.

1.2.2 **DELIVERY OF CONTACT AND BONDS.** Not later than the Pre-Construction meeting and prior to the commencement of any Work on the Project, Contractor shall deliver a fully executed Contract to Owner, along with such bonds as Contractor may be required to furnish, including, but not limited to, a required payment bond in the form and amount specified in the Contract Documents and these General Conditions and a required performance bond in the form and amount specified in the Contract Documents and these General Conditions.

1.2.3 **DELIVERY OF EVIDENCE OF INSURANCE.** Not later than the Pre-Construction meeting, and prior to the commencement of any Work under this Contract, Contractor shall deliver evidence of insurance to Owner. Contractor shall furnish an original completed Certificate of Insurance and a copy of all insurance policies, together with all required endorsements thereto, required by the Contract Documents to the CIMS Contract Services Division, or its delegated department, clearly labeled with the name of the Project and which shall contain all information required by the Contract Documents. Contractor shall be prohibited from commencing the Work and Owner shall have no duty to pay or perform under this Contract until such evidence of insurance is delivered to Owner. No officer or employee, other than Owner's Risk Management Department, shall have authority to waive this requirement.

1.2.4 **NOTICE TO PROCEED AND COMMENCEMENT OF CONTRACT TIMES.** Unless otherwise stated on the Notice to Proceed, the Contract Time will commence to run on the date stated on the Notice to Proceed. No Work shall commence any earlier than the date stated on Notice to Proceed and no Work shall be performed by Contractor or any Subcontractor prior to issuance of the Notice to Proceed. Any work commenced prior to Contractor receiving a Notice to Proceed is performed at Contractor's risk.

1.2.5 **SUBMISSION OF PROJECT SCHEDULE(S).** Prior to comment of Work (unless otherwise specified elsewhere in the Contract Documents), Contractor shall submit to the Director of CIMS or his/her designee the Project schedule(s), as defined in **Section 3.10** herein, a minimum of fifteen (15) days prior to the Pre-Construction Conference.

1.2.6 **PRE-CONSTRUCTION CONFERENCE.** Before Contractor commences any Work on the Project, a Pre-Construction Conference attended by Contractor, Design Consultant, Owner's Designated Representative(s) and others, as appropriate, will

be held to establish a working understanding among the parties as to the Work and discuss, at minimum: the Project Schedule(s) referenced in this **Article 1**; the procedures for handling Shop Drawings and other submittals; the processing of Applications for Payment; and Contractor maintaining required records. The Notice to Proceed may be issued at the Pre-Construction Conference or issued by Owner at any time at Owner's discretion. Said issuance of the Notice to Proceed shall not be unreasonably withheld by Owner.

1.2.7 Payments for services, goods, work, equipment and materials are contingent upon and subject to the availability and appropriation of funds and the sale of future City of San Antonio Certificates of Obligation and/or General Obligation Bonds in accordance with adopted budgets. In the event funds are not available, appropriated or encumbered to fund a Project, then, at City's discretion, this Agreement may be terminated immediately with no additional liability to City.

1.3 CONTRACT DOCUMENTS

1.3.1 **EXECUTION OF CONTRACT DOCUMENTS.** Execution of the Contract by Contractor is a representation Contractor has been provided unrestricted access to the existing improvements and conditions on the Project Site, Contractor thoroughly has investigated the visible conditions at the Site and the general local conditions affecting the Work and Contractor's investigation was instrumental in preparing its bid or proposal submitted to Owner to perform the Work. Contractor shall not make or be entitled to any claim for any adjustment to the Contract Time or the Contract Sum arising from conditions which Contractor discovered or, in the exercise of reasonable care, should have discovered in Contractor's investigation.

1.3.2 **OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE.** The Drawings, Specifications and other documents, including those in electronic form, prepared by Design Consultant, its consultants or other consultants retained by Owner for the Project, which describe the Work to be executed by Contractor (collectively referred to as the "Construction Documents") are and will remain the property of Owner, whether the Project for which they are made is executed or not. Contractor shall be permitted to retain one record set. Neither Contractor nor any Subcontractor, sub-Subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by Design Consultant or Design Consultant's consultants. All copies of Construction Documents, except Contractor's record set, shall be returned or suitably accounted for to Design Consultant on request and upon completion of the Work. The Drawings, Specifications and other documents prepared by Design Consultant and Design Consultant's consultants, along with copies thereof furnished to Contractor, are for use solely with respect to this Project. The drawings, specifications or other documents are not to be used by Contractor or any Subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner. Contractor, Subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Design Consultant

and the Design Consultant's consultants appropriate to and for use in the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by Design Consultant and Design Consultant's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes, in connection with this Project, is not to be construed as publication.

1.3.2.1 All of Contractor's non-proprietary, documentary Work product, including reports and correspondence to Owner, prepared pursuant to this Contract, shall be the property of Owner and, upon completion of this Contract and upon written request by Owner, promptly shall be delivered to Owner in a reasonably organized form, without restriction on its future use by Owner. For the avoidance of doubt, documentary Work product does not include privileged communications, proprietary information and documents used to prepare Contractor's Bid Proposal.

1.3.2.2 Contractor may retain for its files any copies of documents it chooses to retain and may use its Work product as it deems fit. Any materially-significant Work product lost or destroyed by Contractor shall be replaced or reproduced at Contractor's non-reimbursable sole cost. In addition, Owner shall have access during normal business hours, during the duration this Contract is in effect and for four (4) years after the final completion of the Work, unless there is an ongoing dispute under the Contract, then such access period shall extend longer until final resolution of the dispute, to all of Contractor's records and documents covering reimbursable expenses, actual base hourly rates, time cards and annual salary escalation records maintained in connection with this Contract for purposes of auditing same at the sole cost of Owner. The purpose of any such audit shall be for the verification of such costs. Contractor shall not be required to keep records of, or provide access to, the make up of any negotiated and agreed-to lump sums, unit prices or fixed overhead and profit multipliers. Nothing herein shall deny Contractor the right to retain duplicates. Refusal by Contractor to comply with the provisions hereof shall entitle Owner to withhold any payment(s) to Contractor until compliance is obtained.

1.3.2.3 All of Contractor's documentary Work product shall be maintained within Contractor's San Antonio offices, unless otherwise authorized by Owner. After expiration of this Contract, Contractor's documents may be archived in the Contractor's central record storage facility but shall remain accessible to Owner for the four (4) year period cited in **Section 1.3.22** herein.

1.3.3 **CORRELATION AND INTENT.** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by Contractor. The Contract Documents are complementary and what is required by one shall be as binding as if required by all. Performance by Contractor shall be required only to the extent consistent with the Contract Documents and which

reasonably is inferable from the Contract Documents as deemed necessary to produce the indicated results. In cases of discrepancy between any drawing and the dimension figures written thereon:

(1) the dimension figures shall govern over scaled dimensions;

(2) Detailed Drawings and accompanying notations shall govern over general Drawings;

(3) Specifications shall govern over Drawings, subject to **Section 1.3.3.6** herein;

(4) General Conditions and Supplemental Conditions;

(5) Special Conditions shall govern over Specifications, Drawings and General/Supplemental Conditions; and

(6) Negotiated Special Conditions shall govern over Special Conditions.

The most recent revision of Plans shall control over older revisions.

1.3.3.1 Organization of the Specifications into divisions, sections, articles, and the arrangement of Drawings shall not control Contractor in dividing the Work among Subcontractors or establishing the extent of Work to be performed by any trade.

1.3.3.2 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings. Where the phrases "directed by", "ordered by" or "to the satisfaction of" Owner, Design Consultant or Owner's Resident Inspector or other specified designation occur, it is to be understood that the directions, orders or instructions to which they relate are those within the scope of and authorized by the Contract Documents.

1.3.3.3 Reference to manufacturer’s instructions, standard specifications, manuals or codes of any technical society, organization or association, laws or regulations of any governmental authority, or to any other documents, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of Contractor’s Bid Proposal, except as otherwise may be

specifically stated or where a particular issue is indicated. Municipal and utility standards shall govern except in case of conflict with the Specifications. In case of a conflict between the Specifications and the referenced standard, the more stringent shall govern.

1.3.3.4 The most recently issued Document takes precedence over previous issues of the same Document. The order of precedence is as follows, with the highest authority listed herein as "1" and in descending order:

1. Modifications to this Agreement signed by Contractor, Owner and Design Consultant;

2. Addenda, with those of later date(s) having precedence over those with earlier date(s);

3. Special Conditions;

4. General Conditions;

5. Special Provisions (Horizontal Projects);

6. Specifications;

7. Drawings;

1.3.3.5 Should the Drawings and Specifications be inconsistent, contract pricing shall be based on the better quality and greater quantity of work indicated. In the event of the above-mentioned inconsistency, Owner shall determine the resolution of the inconsistency.

1.3.3.6 In the Drawings and Specifications, where certain products, manufacturer's trade names or catalog numbers are given, such information is given for the sole and express purpose of establishing a standard of function, dimension, appearance and quality of design in harmony with the Work and is not intended for the purpose of limiting competition. Materials or equipment shall not be substituted unless such a substitution has been specifically accepted for use on this Project by Owner and Design Consultant.

1.3.3.7 When the work is governed by reference to standards, building codes, manufacturer's instructions or other documents, unless otherwise specified, the edition currently in place as of the date of the submission of the bid shall apply.

1.3.3.8 Requirements of public authorities apply as minimum requirements only and do not supersede more stringent specified requirements.

1.3.4 **INTERPRETATION.** In the interest of brevity, the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an”,

but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

ARTICLE II. OWNER

2.1 GENERAL

2.1.1 The City of San Antonio, Texas, a home-rule, Texas Municipal Corporation located in Bexar County and identified as "Owner" or as "City" in the Contract and these General Conditions, is referred to throughout the Contract Documents as if singular in number. Owner shall designate in writing to Contractor a representative (hereafter referred to as "Owner's Designated Representative" or "ODR") who shall have express authority to bind Owner with respect to all matters concerning this Contract requiring Owner's approval or authorization. Whenever the term "City" or "Owner" is found in this Contract or the Contract Documents, such term shall include the City's agents, elected officials, employees, officers, directors, volunteers, representatives, successors and assigns.

2.1.2 Contractor acknowledges that no lien rights exist with respect to public property.

2.2 INFORMATION AND SERVICES TO BE PROVIDED BY OWNER

2.2.1 Owner will provide and maintain the Preliminary Budget and general schedule, if any, for the Project. The Preliminary Budget will include the anticipated construction cost, contingencies for changes in the Work during construction and other costs that are the responsibility of Owner. The general schedule will set forth Owner's plan for milestone dates and completion of the Project.

2.2.2 Owner shall furnish surveys, if in existence, describing physical characteristics, legal limitations and utility locations. The furnishing of these surveys and reports shall not relieve Contractor of any of its duties under the Contract Documents or these General Conditions. Information or services required of Owner by the Contract Documents shall be furnished by Owner with reasonable promptness following actual receipt of a written request from Contractor. It is incumbent upon Contractor to identify, establish and maintain a current schedule of latest dates for submittal and approval by Owner, as required in **Section 3.10** herein, including when such information or services must be delivered. If Owner delivers the information or services to Contractor as scheduled and Contractor is not prepared to accept or act on such information or services, then Contractor shall reimburse Owner for all extra costs incurred by holding, storage, retention or performance, including redeliveries by Owner in order to comply with the current schedule.

2.2.3 Unless otherwise provided in the Contract Documents, Contractor shall be furnished, free of charge, up to five (5) complete sets of the Plans and Specifications by Design Consultant. Additional complete sets of Plans and Specifications, if requested by Contractor, will be furnished at reproduction cost to Contractor.

2.2.4 Owner's personnel may, but are not required to, be present at the construction site during progress of the Work, along with Design Consultant in the performance of its duties, to verify Contractor's record of the number of workmen employed on the Work site, the workmen's occupational classification, the time each workman is engaged in the Work and the equipment used by the workmen in the performance of the Work, for purpose of verification of Contractor's Applications for Payment and payroll records.

2.2.5 Owner shall reimburse Contractor for the necessary Project-related approvals, fees and required permits with no markup paid to Contractor for these necessary Project-related approvals, fees and required permits costs unless said costs are stipulated in the Contract Documents as a part of the Work.

2.2.6 **OWNER'S RIGHT TO STOP THE WORK**. If Contractor fails to correct Work deemed by Owner to not be in accordance with the requirements of the Contract Documents, as required by **Section 12.3** herein, fails to carry out Work in accordance with the Contract Documents or fails to submit its preliminary schedule(s), bond(s), insurance certificate(s) or any other required submittals, Owner may issue a written order to Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. The right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of the Contractor or any other person or entity. This right shall be in addition to and not in restriction of Owner's rights pursuant to **Section 12.3** herein. Owner's issuance of an order to Contractor to stop the Work shall not give rise to any claim by Contractor for additional time, cost or general conditions costs.

2.2.7 **OWNER'S RIGHT TO CARRY OUT THE WORK**. If Contractor defaults, neglects or fails to carry out the Work in accordance with the Contract Documents and fails, within a three (3) work-day period after receipt of written notice from Owner, to commence and continue correction of such default, neglect or failure with diligence and promptness, Owner may, without prejudice to other remedies Owner may have, correct such deficiencies, neglect or failure. In such case, an appropriate Change Order may be issued deducting from payments then or thereafter due Contractor reflecting the reasonable cost of correcting such deficiencies, neglect or failure of Contractor, including all of Owner's incurred expenses and compensation for Design Consultant's additional services made necessary by such default, neglect or failure of Contractor. If payments then or thereafter due Contractor are not sufficient to cover such amounts for the Work performed, Contractor shall pay the difference to Owner.

ARTICLE III. CONTRACTOR

3.1 GENERAL

3.1.1 Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative.

3.1.2 Contractor shall perform the Work in a good and workmanlike manner, except to the extent the Contract Documents expressly specify a higher degree of finish or workmanship.

3.1.3 Contractor shall not be relieved of its obligations, responsibilities or duties to perform the Work in accordance with the Contract Documents, either by any activities or duties of Design Consultant in Design Consultant's administration of the Contract or by tests, inspections or approvals required or performed by Owner or any person other than the Contractor.

3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

3.2.1 Since the Contract Documents are complementary, before starting each portion of the Work, Contractor carefully shall:

(1) study and compare the various Drawings and other Contract Documents relative to that portion of the Work and the information furnished by Owner;

(2) take field measurements of any existing conditions related to that portion of the Work; and

(3) observe any conditions at the Site affecting the Work.

Any error, inconsistencies or omissions discovered by Contractor shall be reported

promptly to Owner via a Request for Information in such form as the Owner may require.

3.2.1.1 The exactness of existing grades, elevations, dimensions or locations given on any Drawings issued by Design Consultant, or the work installed by other contractors, is not guaranteed by Owner. Contractor shall, therefore, satisfy itself as to the accuracy of all grades, elevations, dimensions and locations.

3.2.1.2 In all cases of interconnection of its Work with existing conditions or with work performed by others, Contractor shall 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, dimensions or locations promptly shall be rectified by Contractor without any additional cost to Owner.

3.2.2 As between Owner and Contractor, and subject to the provisions of **Section 3.2.4** below, Contractor has no responsibility for the timely delivery, completeness, accuracy and/or sufficiency of the Specifications or Drawings (or any errors, omissions, or ambiguities therein), and is not responsible for any failure of the design of the facilities or structures as reflected thereon to be suitable, sound or safe. Contractor shall be deemed to have satisfied itself as to

the design contained in and reflected by the Specifications and the Drawings. In particular, but without prejudice to the generality of the foregoing, Contractor will review the Contract Documents to establish that:

3.2.2.1 the information is sufficiently complete to perform the Work; and

3.2.2.2 there are no obvious or patent ambiguities, inaccuracies or inconsistencies within or between the documents forming the Contract; and

3.2.2.3 Contractor shall work with the aforementioned Contract Documents so as to perform the Work and of each and every part thereof such that the Work and each and every part thereof will, jointly and severally, be in accordance with the requirements of the Contract Documents and in particular, but without limiting the generality of the foregoing, such that the Work as a whole and, as appropriate, each and every part thereof, shall comply with the requirements of any performance specifications.

3.2.3 Any design errors or omissions noted by Contractor during its review promptly shall be reported to Owner, but it is recognized that the Contractor's review is made in Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents. Contractor is not required to ascertain if Contact Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations, but any nonconformity discovered by or made known to Contractor promptly shall be reported both to Owner and Design Consultant.

3.2.4 If Contractor believes additional cost or time is involved because of clarifications or instructions issued by Design Consultant, in response to the Contractor's Notices or Requests for Information, Contractor shall make Claims as provided in **Section 4.3.6** and **Section 4.3.7** herein. If Contractor fails to perform the obligations of **Section 3.2.1** and **Section 3.2.2** herein, Contractor shall pay such costs and damages to Owner as would have been avoided if Contractor had performed such obligations. Contractor shall not be liable to Owner or Design Consultant for damages resulting from errors, inconsistencies or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents, unless Contractor recognized or should have recognized such error, inconsistency, omission or differences and knowingly failed to report it to Owner and Design Consultant, as required by this **Section 3.2.4**.

3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

3.3.1 Contractor shall supervise, inspect and direct the Work competently and efficiently, exercising the skill and attention of a reasonably prudent Contractor, devoting such attention and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor solely shall be responsible for the means, methods, techniques, sequences, procedures and

coordination of all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods and/or techniques, Contractor then shall evaluate the jobsite safety thereof and, except as stated herein below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If, upon its evaluation, Contractor determines such means, methods, techniques, sequences or procedures may not be safe, Contractor shall give timely written notice to Owner and Design Consultant and Contractor shall not proceed with that portion of the Work without further written instructions from Owner. Sequencing and procedures shall be coordinated and agreed upon by Owner, Design Consultant and Contractor.

3.3.2 Contractor shall be responsible to Owner for the acts and omissions of Contractor's agents and employees, Subcontractors and their agents and employees and other persons or entities performing portions of the Work for or on behalf of Contractor or any of its Subcontractors.

3.3.3 Contractor shall be responsible for inspection of portions of Work already performed, to determine which such portion are in proper condition to receive subsequent Work.

3.3.4 Contractor shall bear responsibility for design and execution of acceptable trenching and shoring procedures, in accordance with Texas Government Code, Section 2166.303 and Texas Health and Safety Code, Subchapter C, Sections 756.021, et seq.

3.3.5 It is understood and agreed the relationship of Contractor to Owner shall be of an independent contractor. Nothing contained or inferable in the Contract documents shall be read, deemed or construed to make Contractor the agent, servant or employee of Owner or create any partnership, joint venture or other association between Owner and Contractor. Any direction or instruction by Owner, in respect of the Work, shall relate to the results the Owner desires to obtain from the Work and shall in no way affect Contractor's independent contractor status, as described herein.

3.3.6 Contractor shall review Subcontractor(s) written safety programs, procedures and precautions in connection with performance of the Work. However, Contractor's duties shall not relieve any Subcontractor(s) or any other person or entity (e.g. a supplier), including any person or entity with whom Contractor does not have a contractual relationship, of their responsibility or liability relative to compliance with all applicable federal, state and local laws, rules, regulations and ordinances, which shall include the obligation to provide for the safety of their employees,

persons, and property and their requirements to maintain a work environment free of recognized hazards. The foregoing notwithstanding, the requirements of this **Section 3.4.6** are not intended to impose upon Contractor any additional obligations Contractor would not have under any applicable state or federal laws including, but not limited to, any rules, regulations or statutes pertaining to the Occupational Safety and Health Administration.

3.4 LABOR AND MATERIALS

3.4.1 Unless otherwise provided in the Contract Documents, Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

3.4.2 **PREVAILING WAGE RATE AND LABOR STANDARD PROVISIONS**. The Provisions of Chapter 2258 of the Texas Government Code, and the "Wage and Labor Standard Provisions" amended in City of San Antonio Ordinance 2008-11-20-1045, expressly are made a part of this Contract. In accordance therewith, a schedule of the general prevailing rate of per diem wages in this locality for each craft or type of worker needed to perform this contract shall be obtained by Contractor from the City of San Antonio's Labor Compliance Office and included in Contractor's Project bid package and Plans & Specifications, prior to Contractor bidding of the Project and such schedule shall become a part hereof. Contractor shall forfeit, as a penalty to Owner, sixty dollars ($60.00) for each laborer, workman or mechanic employed for each calendar day, or portion thereof, in which such laborer, workman or mechanic is paid less than the stipulated prevailing wage rates for any work done under this Contract by the Contractor or any Subcontractor employed on the project. The establishment of prevailing wage rates, pursuant to Chapter 2258 of the Texas Government Code, shall not be construed to relieve Contractor from its obligation under any federal or state law, regarding the wages to be paid to or hours worked by laborers, workmen or mechanics, insofar as applicable to the work to be performed hereunder. Contractor, in the execution of this Project, agrees it shall not discriminate in its employment practices against any person because of race, color, creed, sex, or origin. Contractor agrees it will not engage in employment practices which have the effect of discriminating against employees or prospective employees because of race, color, creed, national origin, sex, age, handicap or political belief or affiliation. This Contract provision shall be included in its entirety in all Subcontractor agreement entered into by the Contractor or any Subcontractor employed on the project.

3.4.3 **SUBSTITUTIONS**

3.4.3.1 Contractor's proposed substitutions and alternates may be rejected by Owner without explanation and shall be considered by Owner only under one or more of the following conditions:

(a) the proposal is required for compliance with interpretation of code requirements or insurance regulations then existing;

(b) specified products are unavailable through no fault of Contractor; and

(c) when in the judgment of Owner or Design Consultant, a substitution substantially would be in Owner's best interests in terms of cost, time or other considerations.

3.4.3.2 Contractor shall submit to Owner and Design Consultant:

(a) a full explanation of the proposed substitution and submittal of all supporting data, including technical information, catalog cuts, warranties, test results, installation instructions, operating procedures and other like information necessary for a complete evaluation of the substitution;

(b) a written explanation of the reasons the substitution is necessary, including the benefits to the Owner and to the Work, in the event the substitution is acceptable to Owner;

(c) the adjustment, if any, in the Contract Sum;

(d) the adjustment, if any, in the time of completion of the Contract and the construction schedule; and

(e) in the event of a substitution under **Section 3.4.2.1** herein, an affidavit stating:

(1) Contractor's proposed substitution conforms to and meets all the requirements of the pertinent Specifications and requirements shown on the Drawings; and

(2) Contractor accepts the warranty and correction obligations in connection with the proposed substitution as if originally specified by Design Consultant.

Proposals for substitutions shall be submitted to Design Consultant in sufficient time to allow Design Consultant no less than twenty-one (21) calendar days for review. No substitutions will be considered or allowed without Contractor's submittal of complete substantiating data and information as stated hereinbefore.

3.4.3.3 In the event of a substitution submittal under this **Section 3.4.3**, and whether or not any such proposed substitution is accepted by Owner or Design Consultant, Contractor shall reimburse Owner, at Owner's reasonable discretion, for any fees

incurred and charged by Design Consultant or other consultants for evaluating each proposed substitute.

3.4.3.4 Except as otherwise stipulated in the Contract Documents or required for safety or protection of persons or the Work or property at the Site or adjacent thereto, no Work will be allowed by Owner between the hours of 10:00 p.m. and 6:00 a.m. of the following calendar day, unless directed by the ODR or requested in writing by Contractor and approved by Owner.

3.4.4 Contractor shall, at all times, enforce strict discipline and good order among persons working on the Project and shall not employ or continue to employ any unfit person on the Project or any person not skilled in the assigned work. Contractor shall be liable for and responsible to Owner for all acts and omissions of its employees, all tiers of its Subcontractors, material suppliers, anyone who Contractor may allow to perform any Work on the Project and their respective officers, agents, employees, and consultants who Contractor may allow to come on the job site, with the exception of Owner or Owner's Designee. Owner, at any time, for any reason or for no reason, may direct Contractor to remove any employee, Subcontractor, material supplier or anyone else from the Project and Contractor promptly shall comply with Owner's direction. In addition, if Contractor receives written notice from Owner complaining about any Subcontractor, employee or anyone who is a hindrance to proper or timely execution of the Work, Contractor shall remedy such complaint without delay to the Project and at no additional cost to Owner. This provision shall be included in all contracts between the Contractor and all Subcontractors of all tiers.

3.4.5 Contractor recognizes and acknowledges that the Project Site is a public facility representing the City of San Antonio. As such, Contractor shall prohibit the possession or use of alcohol, controlled substances, tobacco and any prohibited weapons on the Project Site and shall require appropriate dress of Contractor's forces consistent with the nature of the Work being performed, including the wearing of shirts at all times. Harassment of any kind, including sexual harassment, of employees of Contractor or any Subcontractor, employees or consultants of Owner or any visitor to the site by employees of Contractor or a Subcontractor strictly is forbidden. Any employee of Contractor or a Subcontractor who is found to have engaged in such conduct shall be subject to appropriate disciplinary action by Contractor, including removal from the Project Site.

3.4.6 Contractor only shall employ or use labor in connection with the Work capable of working harmoniously with all trades, crafts and any other individuals associated with the Project.

3.4.7 All materials and installed equipment shall be as specified in the Contract Documents, and if not specified, shall be of good quality and shall be new, except as otherwise provided in the Contract Documents. If required by Owner or Design Consultant, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind and quality of materials and equipment

installed. Contractor may make substitutions only with the consent of Owner, after Contractor's compliance with **Section 3.4.2** herein.

3.4.8 All materials shall be shipped, stored and handled in a manner which will protect and ensure their condition at the time of incorporation in the Work. After installation, all materials shall be properly protected against damage to ensure they are in the condition as required by **Section 3.5.1** herein when the Work is Substantially Completed or Owner takes over use and occupancy, whichever is earlier.

3.4.9 Contractor shall procure and furnish to Owner all guarantees, warranties, spares and maintenance manuals called for by the Specifications or which normally are provided by a manufacturer. The maintenance manual shall include a catalog for any equipment, materials, supplies or parts used in the inspection, calibration, maintenance or repair of the equipment and items in the catalog shall be readily available for purchase.

3.4.10 During construction of the Work and for four (4) years after final completion or longer if, during the duration of this Contract or during the four (4) years after the final completion of the Work, a dispute between any parties to this Project exists, Contractor shall retain and shall require all Subcontractors to retain for inspection and audit by Owner all books, accounts, reports, files, time cards, material invoices, payrolls and evidence of all other direct or indirect costs related to the bidding and performance of this Work. Upon request by Owner, a legible copy or the original of any or all such records shall be produced by Contractor at the administrative office of Owner. To the extent that it requests copies of such documents, Owner will reimburse Contractor and its Subcontractors for copying costs. Contractor shall not be required to keep records of or provide access to the make up of any negotiated and agreed-to lump sums, unit prices or fixed overhead and profit multipliers.

3.5 WARRANTY

3.5.1 Contractor warrants to Owner materials and equipment furnished and installed under the Contract will be of good quality and new, unless otherwise required or permitted by the Contract Documents, the Work will be free from defects not inherent in the quality required or permitted and the Work will conform to the requirements of the Contract Documents. Work not conforming to this warranty and these requirements, including substitutions not properly approved and authorized by Owner, may be considered defective. Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not

executed by the Contractor, improper or insufficient maintenance, improper operation, normal wear and tear and normal usage, and additional damage or defects caused by Owner's failure to promptly notify Contractor. If required by Owner, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

3.5.2 A right of action by Owner for any breach of Contractor's express warranty herein shall be in addition to, and not in lieu of, any other remedies Owner may have under this Contract at law or in equity, regarding any defective Work.

3.5.3 The warranty provided in **Section 3.5.1** herein shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Contract Documents. Such warranty shall be interpreted to require Contractor, upon written timely demand by Owner, to replace defective materials and equipment and re-execute any defective Work disclosed to the Contractor by the Owner within a period of one (1) year after Substantial Completion of the applicable Work or, in the event of a latent defect, within one (1) year after discovery thereof by Owner.

3.5.4 All warranties shall be assignable by Owner. Submittal of all warranties and guarantees are required as a prerequisite to the final payment.

3.5.5 Except when a longer warranty time is specifically called for in the Specifications or is otherwise provided by law or by manufacturer, all warranties shall be at minimum for twelve (12) months and shall be in form and content otherwise reasonably satisfactory to Owner. Owner and Contractor acknowledge that the Project may involve construction work on more than one (1) building or section of infrastructure of Owner's. Each building, section of infrastructure or approved phase of each section of infrastructure may have its own separate and independent date of Substantial Completion or Final Completion. If separate dates for Substantial Completion and Final Completion are granted by Owner, Contractor shall maintain a complete and accurate schedule of the dates of Substantial Completion and dates upon which the one (1) year warranty on each building, phase or section of infrastructure that achieved Substantial Completion will expire. If separate dates are granted, Contractor agrees to provide notice of the warranty expiration date(s) to Owner and Design Consultant at least one (1) month prior to the expiration of the one (1) year warranty period on each building, section of infrastructure or each phase of the section of infrastructure which has achieved Substantial Completion. Prior to termination of any one (1) year warranty period, Contractor shall accompany Owner and Design Consultant on re-inspection of the building, section of infrastructure or phase of the section of infrastructure and be responsible for correcting any reasonable additional deficiencies not caused by the Owner or by the use of the building, section of infrastructure or phase of the section of infrastructure observed and/or reported during the re-inspection. For extended warranties required by the Contract Documents, Owner will notify Contractor of deficiencies and Contractor shall start remedying these defects within seven (7) calendar days of initial notification from Owner. Contractor shall prosecute the work without interruption until

accepted by Owner and Design Consultant, even though such prosecution may extend beyond the limit of the warranty period. If Contractor fails to provide notice of the expiration of the one (1) year warranty period at least one (1) month prior to the expiration date and conduct the required walk through with Owner, Contractor's warranty obligations described in this **Section 3.5.5** shall continue until such inspection is conducted and any deficiencies found in the inspection is corrected.

3.5.6 Warranties shall become effective on a date established by Owner in accordance with the Contract Documents. This date shall be the date of Substantial Completion of the entire Work, unless otherwise provided in any Certificate of Partial Substantial Completion approved by the parties, except for Work to be completed or corrected after the date of Substantial Completion and prior to final payment and those occurrences addressed in **Section 3.5.4** herein. Warranties for Work to be completed or corrected after the date of Substantial Completion and prior to Final Completion shall become effective on the later of the date the Work is completed or corrected and accepted by Owner and Design Consultant or the date of final completion of the Work.

3.5.7 Neither final payment nor compliance by Contractor with any provision in the Contract Documents shall constitute an acceptance of Work not done in accordance with the Contract Documents or relieve Contractor or its sureties of liability, with respect to any warranties or responsibility for faulty materials and workmanship. Contractor warrants that the Work will conform to the requirements of the Contract Documents.

3.5.8 Contractor agrees to assign to Owner, at the time of Final Completion of the Work, any and all manufacturer's warranties relating to materials and labor used in the Work and further agrees to perform the Work in such manner so as to preserve any and all such manufacturer's warranties, provided that such assignment shall contain a reservation of Contractor's right also to enforce the manufacturer's warranties. As a condition precedent to final payment, Contractor shall prepare a notebook with reference tabs and submit three (3) copies of the notebook to Owner that includes a complete set of warranties from Subcontractors, manufacturers or suppliers, as appropriate, and executed by and between Contractor and Owner, as required under this Agreement, with a specified warranty commencement date, as required by the Contract Documents. Copies of the complete set of warranties from Subcontractors, manufacturers and/or suppliers, as appropriate, executed by Contractor as required by the Contract Documents, with and between Owner and Contractor. A specified warranty commencement date, as required by the Contract Documents, also shall be submitted to Owner in an electronic format (PDF) on a Compact Disc (CD).

3.5.9 When Contractor is constructing a building, the building shall be watertight and leak proof at every point and in every area, except where leaks can be attributed to damage to the building by external forces beyond Contractor's control. Contractor, immediately upon notification by the Owner of water penetration, shall determine the source of water penetration and perform any work necessary

to make the building watertight. Contractor also shall repair or replace any damaged material, finishes and/or fixtures damaged as a result of any water penetration, returning the building to original condition. The costs of such determination and repair shall be borne by Contractor only to the extent that the leak(s) is/are attributable to faulty workmanship or unauthorized or defective materials.

3.6 TAXES. Contractor will not include in the Contract Sum or any modification thereto any amount for sales, use or similar taxes for which Owner is exempt. Upon request by Contractor, Owner will provide Contractor with a tax exemption certificate or other documentation necessary to establish Owner's exemption from such taxes.

3.7 PERMITS, FEES AND NOTICES

3.7.1 **PERMITS.** Unless otherwise provided in the Contract Documents or by Owner, as per **Section 2.2.2** herein, it is the responsibility of and Contractor shall secure all permits, licenses and inspections. Owner and Design Consultant may assist Contractor, when necessary, in obtaining such permits, licenses and inspections necessary for the proper execution and completion of the work. For federally funded construction projects, when applicable, Owner shall prepare and submit the necessary paperwork to satisfy Texas Pollutant Discharge Elimination System (hereafter referred to as "TPDES"), regulations of the Texas Commission on Environmental Quality.

3.7.2 Contractor shall comply with and give all notices required by law, ordinance, rule, regulations and lawful orders of public authorities applicable to performance of the Work.

3.7.3 It is not Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes and rules and regulations. However, if Contractor observes that portions of the Contract Documents are at variance therewith, Contractor promptly shall notify Owner and Design Consultant in writing of any variances and all necessary changes shall be accomplished by appropriate modification(s) before Contractor performs any Work affected by such modification(s).

3.7.4 If Contractor performs Work knowing Work is contrary to laws, statutes, ordinances, building codes and rules and regulations, without such notice to and approval from Owner and Design Consultant, Contractor shall assume sole responsibility for performing such Work and shall bear all costs attributable to correct such Work.

3.7.5 Contractor also shall assist Owner in obtaining all permits and approvals and, at Owner's request, pay all fees and expenses, if any, associated with TPDES regulations of the Texas Commission on Environmental Quality, as well as local authorities, if applicable, which require completion of documentation and/or acquisition of a "Land Disturbing Activities Permit" for a Project. Contractor's obligations under this paragraph do not require it to perform engineering services

during the pre-construction phase to prepare proper drainage for the Project Site. However, any drainage alterations made by Contractor during the construction process, which require the issuance of a permit, shall be at Contractor's sole cost. It will be Contractor's responsibility to prepare and submit the permit approval documentation provided by the regulatory agencies prior to beginning any Work.

3.8 ALLOWANCES

3.8.1 Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as Owner may direct, but Contractor shall not be required to employ persons or entities to whom Contractor has reasonable objection.

3.8.2 Unless otherwise provided in the Contract Documents:

3.8.2.1 Allowances shall cover the cost to Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

3.8.2.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses, contemplated for stated allowance, shall be included in the allowances;

3.8.2.3 Whenever actual costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect both the difference between actual costs and the allowances under **Section 3.8.2.1** herein and all changes in Contractor's costs under **Section 3.8.2.2** herein.

3.8.3 Materials and equipment under an allowance shall be selected by Owner within such time as is reasonably specified by Contractor as necessary to avoid any delay in the Work.

3.9 SUPERINTENDENT/KEY PERSONNEL

3.9.1 At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who is able to communicate fluently in English, along with any necessary assistant(s) who is/are satisfactory to Owner. Any superintendent designee shall be identified in writing to Owner promptly after Owner issues written Notice to Proceed. The superintendent shall represent Contractor at all time and all directions given to the superintendent shall be binding on Contractor. The designated superintendent shall not be replaced without written notice to and the approval of Owner, which approval will not be unreasonably withheld, except with good reason (including any termination or disability of the superintendent) or under extraordinary circumstances. The superintendent may not be employed on any other project prior to Final

Completion of the Work without the approval of Owner, which approval will not be unreasonably withheld.

3.9.2 Contractor shall furnish a list to Design Consultant and Owner of all Architects, Engineers, consultants, Sub-Consultants, job-site superintendents, Subcontractors and suppliers involved in the Project construction. Design Consultant also shall provide said information to Owner.

3.9.2.1 Owner, upon the showing of good and reasonable cause, may reject or require removal of any Architect, Engineer, consultant, sub-consultant, job superintendent, employee of the Contractor, Subcontractor or sub-Subcontractor and/or supplier involved in the Project.

3.9.2.2 Contractor shall provide an adequate staff for the proper coordination and expedition of the Work. Owner reserves the right to require Contractor to remove from the Project any employee(s) Owner, at its sole discretion, deems incompetent, careless, insubordinate, unnecessary or in violation of any provision in these Contract Documents. This provision is applicable to Subcontractors, sub-Subcontractors and their employees.

3.9.2.3 Owner reserves the right to utilize one or more of its employees or consultants to function in the capacity of Owner's Inspector, whose primary function will be daily inspections, checking pay requests or construction timelines and the verification of the storage of supplies and materials.

3.9.2.4 Contractor shall not change any key personnel or key Subcontractors without the prior written consent of Owner, which consent shall not be unreasonably withheld. In the event key personnel leaves Contractor's employment, such key personnel's replacement shall be subject to Owner's reasonable approval.

3.10 CONTRACTOR'S PROJECT SCHEDULES

3.10.1 **PROJECT SCHEDULE METHOD.** Contractor shall create and maintain a Critical Path Method (hereafter referred to as "CPM") Project Schedule, showing the manner of execution of Work which Contractor intends to follow, in order to complete the Project within the allotted time. The Project Schedule shall employ computerized CPM for the planning, scheduling and reporting of Work, as described in this **Section 3.10**. Contractor shall create and maintain the Project Schedule using project management scheduling software compatible with Owner's project management scheduling software. The observance of the requirements herein is an essential part of the Work to be performed under the Contract.

3.10.2 **SCHEDULING PERSONNEL.** Unless otherwise indicated in writing by Owner, Contractor shall provide an individual, who shall be referred to hereafter as "Scheduler", to create and maintain the Project Schedule. Scheduler shall be proficient in CPM analysis, possess sufficient experience to be able to perform required tasks on the specified software and able to prepare and interpret reports from the software. Scheduler shall be made available for discussion or meetings when requested by Owner.

3.10.3 **PROJECT SCHEDULE SUBMISSION**

3.10.3.1 Unless indicated otherwise, Contractor shall submit Project Schedule(s) for the Work in relation to the entire Project to Owner and Design Consultant at least fifteen (15) calendar days prior to the pre-construction conference.

3.10.3.2 All Project Schedule submittals shall be in the electronic form to include PDF plots of the schedule, a PDF plot defining the Critical Path and two week look-ahead, and include the native compatible scheduling file format. Contractor shall submit the schedule to Owner and Design Consultant via electronic mail, CD-Rom or any other electronic format acceptable to Owner.

3.10.3.3 This initial schedule shall indicate the dates for starting and completing the various aspects/phases required to complete the Work, including mobilization, procurement, installation, testing, inspection and acceptance of all the Work of the Contract, including any contractually mandated milestone dates. The Project Schedule shall not exceed the time limits set forth in the Contract Documents. Contractor shall organize the Project Schedule and provide adequate detail so the Schedule is capable of measuring and forecasting the effect of delaying events on completed and uncompleted activities.

3.10.3.4 The Project Schedule shall show the order in which Contractor proposes to carry out the Work in accordance with the final approved phasing plan, if any, and the anticipated start and completion dates of each phase of the Work. The Project Schedule shall be in the form of a time scaled work progress chart, to indicate the percentage of Work scheduled for completion at various critical milestones.

3.10.3.5 Contractor shall maintain a schedule of Shop Drawings and Sample Submittals and each submitted Shop Drawing and Sample Submittal shall list each required submittal and the expected time(s) for submitting, reviewing and processing such submittal.

3.10.3.6 Owner will review the Project Schedule within fifteen (15) calendar days for compliance with the specifications and notify Contractor of its acceptability.

3.10.4 **PROJECT SCHEDULE SEQUENCING.** The Project Schedule shall show the sequence and interdependence of activities required for complete performance of the Work. Contractor shall be responsible for assuring all Work sequences are logical and show a coordinated plan of Work in accordance with the sequence of work outlined in the plans. The purpose of Owner requiring the Project Schedule shall be to:

3.10.4.1 Ensure adequate planning during the execution and progress of the Work in accordance with the allowable number of calendar days and all milestones;

3.10.4.2 Assure coordination of the efforts of Contractor, Owner, utilities and others that may be involved in the Project and those activities are included in the Schedule highlighting coordination points with others;

3.10.4.3 Assist Contractor and Owner in monitoring the progress of the Work and evaluating proposed changes to the Contract; and

3.10.4.4 Assist Owner in administering the Contract time requirements.

3.10.5 **PROJECT SCHEDULE ACTIVITIES.** Contractor shall provide Owner a legend for all abbreviations used. The activities shall be coded so that organized plots of the Project Schedule may be produced. Typical activity coding includes traffic control phase, location and work type. Contractor shall show an estimated production rate per working day for each Work activity. Activity durations shall be based on production rates shown. Each activity on the Project Schedule shall include:

3.10.5.1 An activity number utilizing an alphanumeric designation system that is agreeable to Owner;

3.10.5.2 A concise description of the Work represented by the activity; and

3.10.5.3 Activity durations in whole work days, with a maximum of twenty (20) work days. Durations greater than twenty (20) work days may be used for non-construction activities (mobilization, submittal preparation, curing, etc.), and other activities mutually agreeable between Owner and Contractor.

3.10.6 **PROJECT SCHEDULE WORK DURATION AND RESOURCES**

3.10.6.1 The Project Schedule layout shall be grouped by Project and then by Work Breakdown Structure (hereafter referred to as "WBS") for organizational purposes.

3.10.6.2 The original and remaining Work duration shall be displayed. The grouping band will, by default, report Work days planned. One additional level of effort activity shall be added to the schedule as a "time calculator" with a seven (7) day calendar without holidays reflected. The calculation of days should be reflected in the appropriate duration columns.

3.10.6.3 Work shall be scheduled based upon Contractor's standard five (5) day work week, utilizing the appropriate calendar assignments and using compatible Project Scheduling software.

3.10.6.4 Assign working calendars for the days Contractor plans to work. Contractor shall designate all twelve (12) Owner holidays as non-working days (holidays). For dates beyond the then-current calendar year, Contractor shall assume Owner holidays are the same as the current calendar year.

3.10.6.5 Seasonal weather conditions shall be considered and included in the Project Schedule for all work influenced by temperature and/or precipitation. Seasonal weather conditions shall be determined by an assessment of average historical climatic conditions. Average historical weather data is available through the National Oceanic and Atmospheric Administration (hereafter referred to as "NOAA"). These effects shall be simulated through the use of work calendars for each major work type (i.e., earthwork, concrete paving, structures, asphalt, drainage, etc.). Project and work calendars should be updated each month to show days actually able to work on the various work activities.

3.10.6.6 Only Owner-responsible delays in activities that affect milestone dates or the Contract completion date, as determined by CPM analysis, will be considered for a time extension.

3.10.7 **PROJECT SCHEDULE - OTHER REQUIREMENTS.** The Project Schedule shall:

3.10.7.1 have all Work coded and organized by WBS. An example of an acceptable WBS will be provided, upon written request, by Owner to Contractor;

3.10.7.2 reflect Duration Percent complete as the percent complete type;

3.10.7.3 reflect Fixed Units as the duration type;

3.10.7.4 include submittals with a logical tie to what each drives;

3.10.7.5 add proposed Change Order(s) and those Change Order(s) shall be reflected on the Schedule as proposed Change Order(s). This task will

be linked to the schedule with logical ties and approved by Owner. Upon approval of a Change Order, a task shall be renamed and shall identify Work performed and Change Order number and resources will be added to the task;

3.10.7.6 only have constraints in accordance with the plans;

3.10.7.7 include activity milestones for material delivery;

3.10.7.8 disallow default progress; and

3.10.7.9 include a detailed explanation in the Project narrative, if Work is performed out of sequence.

3.10.8 **PROJECT SCHEDULE JOINT REVIEW AND ACCEPTANCE**

3.10.8.1 The Project Schedule and successive updates or revisions thereof are for Contractor's use in managing the Work. The Project Schedule is for the information of Owner and to demonstrate that Contractor has complied with requirements for planning the Work. Owner's acceptance of a Schedule and Schedule updates or revisions constitutes Owner's agreement to coordinate its own activities with Contractor's activities, as shown on the schedule.

3.10.8.2 Within fifteen (15) calendar days of receipt of Contractor's proposed Project Schedule, Owner shall evaluate the Schedule for compliance with this specification and notify Contractor of its findings. If Owner requests a revision or justification, Contractor shall provide satisfaction to Owner within seven (7) calendar days. If Contractor submits a Project Schedule for acceptance, based on a sequence of work not shown in the plans, Contractor shall notify Owner in writing of said sequence of work, separate from the Schedule submittal.

3.10.8.3 Owner's review and acceptance of Contractor's Project Schedule only is for conformance to the requirements of the Contract Documents. Review and acceptance by Owner of Contractor's Project Schedule does not relieve Contractor of any of its responsibility for the Project Schedule, Contractor's ability to meet interim milestone dates (if so specified) or meeting the Contract completion date, nor does such review and acceptance expressly or by implication warrant, acknowledge or admit the reasonableness of the logic, durations, manpower or equipment loading of Contractor's Project Schedule. In the event Contractor fails to define any element of Work, activity or

logic and Owner's review does not detect this omission or error, such omission or error, whether or when discovered by Contractor or Owner, shall be corrected by Contractor at the next monthly schedule update and shall not affect the Project or Contract completion date.

3.10.8.4 Acceptance of the Project Schedule, or update and/or revision thereto, does not indicate any approval of Contractor's proposed sequences and duration.

3.10.8.5 Acceptance by Owner of the Project Schedule or updated Project Schedule which exceeds contractual time does not alleviate Contractor from meeting the contractual completion date.

3.10.8.6 Acceptance of a Project Schedule update or revision indicating early or late completion does not constitute Owner's consent to any changes, alter the terms of the Contract, waive either Contractor's responsibility for timely completion, or waive Owner's right to damages for Contractor's failure to do so.

3.10.8.7 Contractor's scheduled dates for completion of any activity or of the entire Work do not constitute a change in terms of the Contract. Change Orders are the only method of modifying the completion date(s) and Contract time.

3.10.8.8 Submittal of a schedule, schedule revision or schedule update constitutes Contractor's representation to Owner, as of the date of the submittal, of the accurate depiction of all progress to date and that Contractor will follow the schedule as submitted in performing the Work.

3.10.9 **PROJECT SCHEDULE UPDATES AND REVISIONS**

3.10.9.1 The Project Schedule shall be updated monthly, at a minimum, to reflect progress to date and current plans for completing the Work. A paper and an electronic copy of the update shall be submitted to Owner and Design Consultant as directed. Owner has no duty to make progress payments to Contractor unless Contractor's payment application accompanied by the updated Project Schedule. The anticipated date of Substantial Completion shall show all extensions of time granted through Change Order(s) as of the date of the update.

3.10.9.2 The Project Schedule update shall be submitted no later than the date the pay application is submitted.

3.10.9.3 Contractor shall meet with Owner each month, at a scheduled Project Schedule update meeting, to review actual progress made through the data date of the schedule update, as determined by Owner. The review of progress will include dates of activities actually started and/or completed, the percentage of Work completed, the remaining duration of

each activity started and/or completed and the amount of Work still to complete, with an analysis of the relationship between the remaining duration of the activity and the quantity of material to install over that given period of time with a citation of past productivity.

3.10.9.4 The monthly Schedule Update shall include a progress narrative, explaining the Project's progress, identifying all progress made out of sequence, defining the Critical Path, identification of any potential delays, and other relevant data. A Project Schedule Narrative template will be required for the narrative. Upon request, Owner shall supply said template to Contractor.

3.10.9.5 Each Schedule shall segregate the Work into a sufficient number of activities to facilitate the efficient use of critical path method scheduling by Contractor, Owner and Design Consultant. The Project Schedule layout shall be grouped first by Project then by WBS. The layout shall include the following columns:

(1) Activity ID

(2) Activity Description

(3) Original Durations

(4) Remaining Durations

(5) Early Start and Early Finish Dates

(6) Late Start and Late Finish Dates

(7) Total Float

(8) Performance Percent Complete

(9) Display logic and target bars in the Gantt bar chart view

3.10.9.6 Each schedule shall include activities representing manufacturing, fabrication or ordering lead time for materials, equipment or other items for which Design Consultant is required to review submittals, shop drawings, product data or samples.

3.10.9.7 Each schedule, other than the initial schedule, shall:

(1) indicate the activities, or portions thereof, which have been completed;

(2) reflect the actual time for completion of such activities; and

(3) reflect any changes to the sequence or planned duration of all activities.

3.10.9.8 If any updated schedule exceeds the time limits set forth in the Contract Documents for Substantial Completion of the Work, Contractor shall include, along with its updated schedule, a statement of the reasons for the anticipated delay in achieving Substantial Completion of the Work and Contractor's planned course of action for completing the Work within the time limits set forth in the Contract Documents. If Contractor asserts that the failure of Owner or Design Consultant to provide requested and required information to Contractor as the reason for anticipated delay in completion, Contractor also shall specify what information has been requested and is required from Owner or Design Consultant.

3.10.9.9 Neither Owner nor Contractor shall have exclusive ownership of float time in the schedule and all float time shall inure to the benefit of the Project.

3.10.9.10 Submission of any schedule under this Contract constitutes a representation by Contractor that, as of the date of the submittal:

(1) the schedule represents the sequence in which Contractor intends to prosecute the remaining Work;

(2) the schedule represents the actual sequence and duration used to prosecute the completed Work;

(3) to the best of its knowledge and belief, Contractor is able to complete the remaining Work in the sequence and time indicated; and

(4) that Contractor intends to complete the remaining work in the sequence and time indicated.

3.10.9.11 If Contractor desires to make major changes in the Project Schedule, Contractor shall notify Owner in writing and submit the proposed schedule revision. The written notification shall include the reason for the proposed revision, what the revision is composed of and how the revision was incorporated into the schedule. Major changes are hereby defined as those that may affect compliance with the contract requirements or those that change the critical path. All other changes may be accomplished through the monthly updating process without written notification.

3.10.10 **COMPLETION OF WORK**

3.10.10.1 Contractor is accountable for substantially completing the Work in the Contract Time or as otherwise amended by Change Order.

3.10.10.2 If, in the sole judgment of Owner, the Schedule update reflects Work is behind schedule and the rate of performance of Work is inadequate to regain scheduled progress to insure Contractor achieving any Project Milestones (including, but not limited to, Substantial Completion) in accordance with the Project Schedule, Owner may, at its sole option, give written notice to Contractor and direct Contractor, at Contractor's sole expense, to propose and adopt a plan to accelerate the Work so that the Work conforms to the Project Schedule and Project Milestones previously agreed upon. Contractor may, but is not limited to, propose:

(1) increasing Project work forces;

(2) increasing Project equipment or tools;

(3) increasing the hours of work or number of shifts per day;

(4) expediting the delivery of Project materials;

(5) changing, with the approval of Owner, the schedule logic and Work sequences; or

(6) taking some other action as Contractor may proposes, if acceptable to Owner.

3.10.10.3 Within ten (10) calendar days after such notice from Owner, Contractor shall notify Owner in writing of the specific measures taken and/or planned to be taken to increase the rate of progress of Work on the Project. Contractor shall include an estimate as to the date of scheduled full progress recovery and an updated Project Schedule, illustrating Contractor's plan for achieving timely completion of the Project Milestone's and the Project's Substantial Completion.

3.10.10.4 Should Owner deem Contractor's plan of action inadequate to achieve the desired acceleration to bring the Work back on the Project Schedule and achieve Substantial Completion on time, Owner shall have the right to order Contractor, at Contractor's sole expense, to take any corrective measures Owner deems necessary to expedite the progress of Work including, without limitations:

(1) increasing work forces and hours, to include Contractor working additional shifts of overtime;

(2) supplying additional manpower, equipment and facilities;

(3) re-sequencing the Work;

(4) expediting the fabrication and supply of materials; and/or

(5) other similar measures Owner may direct (hereafter **(1) – (5)** herein collectively referred to as "Extraordinary Measures").

Such Extraordinary Measures Owner directs shall continue until the progress of the Work complies with the Milestone required by the Contract Documents.

3.10.10.5 Owner's right to require Extraordinary Measures solely is for the purpose of ensuring Project Milestones and Substantial Completion of the Work is achieved within the Contract Time. Contractor shall not be entitled to an adjustment in the Contract Sum in connection with Extraordinary Measures required by Owner under or pursuant to this **Section 3.10**, except as may be provided under the provisions of **Section 4.3.11** herein.

3.10.10.6 Owner may exercise the rights furnished pursuant to this **Section 3.10.5** as frequently as Owner deems necessary to ensure Contractor's performance of the Work is in compliance with any milestone date or completion date(s) set forth in the Contract Documents.

3.10.10.7 If reasonably required by Owner, Contractor also shall prepare and furnish Project cash flow projections, manning data for critical activities and schedules for the purchase and delivery of all critical equipment and material, together with periodic updating thereof.

3.10.10.8 Contractor shall recommend to Owner and Design Consultant a schedule for procurement of long-lead time items, which will constitute part of the Work as required to meet the Project Schedule.

3.10.11 **PROJECT SCHEDULE TIME IMPACT ANALYSIS**

3.10.10.1 Contractor shall notify Owner when an impact may justify an extension of Contract time or adjustment of milestone dates. Said notice shall be made by Contractor in writing as soon as possible, but no later than the end of the next estimate period after the commencement of an impact or the notice for a change is given to Contractor. Not providing notice to Owner within twenty (20) calendar days after receipt will indicate Contractor's approval of the

time charges as shown on that time statement. Future consideration of that statement will not be permitted and Contractor forfeits its right to subsequently request a time extension or time suspension unless the circumstances are such that Contractor could not reasonably have knowledge of the impact by the end of the next estimate period.

3.10.11.1 When changes are initiated or impacts are experienced, Contractor shall submit to Owner a written Time Impact Analysis describing the influence of each change or impact. A "Time Impact Analysis" is an evaluation of the effects of changes in the construction sequence, contract, plans or site conditions on Contractor's plan for constructing the Project, as represented by the schedule. The purpose of the Time Impact Analysis is to determine if the overall Project has been delayed and, if necessary, to provide Contractor and Owner a basis for making adjustments to the Contract.

3.10.11.2 A Time Impact Analysis shall consist of one or all of the steps listed below:

(1) Establish the status of the Project before the impact using the most recent Project Schedule Update prior to the impact occurrence.

(2) Predict the effect of the impact on the most recent Project Schedule Update prior to the impact occurrence. This requires estimating the duration of the impact and inserting the impact into the schedule update. Any other changes made to the schedule including modifications to the calendars or constraints shall be noted.

(3) Track the effects of the impact on the schedule during its occurrence. Note any changes in sequencing and mitigation efforts.

(4) Compare the status of the work prior to the impact **(#1 above)** to the prediction of the effect of the impact **(#2 above)**, and to the status of the work during and after the effects of the impact are over **(#3 above)**. Note that if an impact causes a lack of access to a portion of the Project, the effects of the impact may extend to include a reasonable period for remobilization.

3.10.11.3 The Time Impact Analysis shall be electronically submitted to Owner. If the Project Schedule is revised after the submittal of a Time Impact Analysis but prior to its approval, Contractor promptly shall indicate in writing to Owner the need for any modification to its Time Impact Analysis. One (1) copy of each Time Impact Analysis shall be submitted within fourteen (14) calendar days after the completion of an impact. Owner may require **Step 1** and **Step 2** in **Section 3.10.11.2** herein of the Time Impact Analysis be submitted at the commencement of the impact, if needed to make a decision regarding the suspension of Contract time. Approval or rejection of each Time Impact Analysis

by Owner shall be made within fourteen (14) calendar days after receipt, unless subsequent meetings and negotiations are necessary.

3.11 DOCUMENTS AND SAMPLES AT THE SITE

3.11.1 Contractor shall maintain, on Site and for Owner's use, one record copy of the Drawings, Specifications, Addenda, Change Orders and other Amendments, in good order and currently marked, to record field changes and selections made during construction, along with one record copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These record copies also shall be available to Design Consultant and shall be delivered to Design Consultant for submittal to Owner upon completion of the Work.

3.11.2 Contractor shall at all times maintain job records including, but not limited to, invoices, payment records, payroll records, daily reports, logs, diaries and job meeting minutes applicable to the Project. Contractor shall make such reports and records available for inspection by Owner, Design Consultant and/or their respective agents, during normal business hours if requested by Owner.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.1 Shop Drawings are drawings, diagrams, illustrations, schedules, performance charts, brochures and other data prepared and furnished by Contractor or its agents, manufacturers, suppliers or distributors and which illustrate and detail some portion of the Work.

3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by Contractor to illustrate materials or equipment for some portion of the Work.

3.12.3 Samples are physical samples of materials, equipment or workmanship that are representative of some portion of the Work, furnished by the Contractor to Owner to assist Owner and Design Consultant in the establishment of workmanship and quality standards by which the Work will be judged.

3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittals is to demonstrate, for those portions of the Work for which submittals are required by the Contract Documents, the way by which Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by Design Consultant is subject to the limitations of **Section 4.2.8** herein. Informational submittals, upon which Design Consultant is not expected to take responsive action, may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Design Consultant without action.

3.12.5 Contractor shall review for compliance with the Contract Documents, approve and submit to Design Consultant Shop Drawings, Product Data, Samples and

similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by Contractor may be returned by Design Consultant without action.

3.12.6 By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, Contractor represents that it has determined and verified materials, field measurements and filed construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

3.12.7 Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal and review has been approved by Design Consultant. Design Consultant shall review and return such submittals within ten (10) calendar days or within a reasonable period so as to not delay the project.

3.12.8 The Work shall be in accordance with approved submittals, except that Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by Design Consultant's approval of Shop Drawings, Product Data, Samples or similar submittals unless Contractor specifically has informed Design Consultant in writing of such deviation at the time of submittal and:

(1) Design Consultant has given written approval in the specific deviation as a minor change in the Work; or

(2) a Change Order or Field Work Directive has been issued authorizing the deviation. Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by Design Consultant's approval thereof.

3.12.9 Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by Design Consultant on previous submittals. In the absence of such written notice, Design Consultant's approval of a resubmission shall not apply to such revisions.

3.12.10 Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering unless such services specifically are required by the Contract Documents for a portion of the Work or unless Contractor needs to provide such services in order to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment specifically are

required of Contractor by the Contract Documents, Owner and Design Consultant will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly Texas-licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Design Consultant. Owner and Design Consultant shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Design Consultant have specified to Contractor all performance and design criteria that such services must satisfy. Pursuant to this **Section 3.12.10**, Design Consultant will review, approve or take other appropriate action on submittals only for the limited purpose of checking of conformance with information given and the design concept expressed in the Contract Documents. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

3.13 USE OF SITE

3.13.1 Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to areas permitted by law, ordinances, permits or the requirements of the Contract Documents and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

3.13.2 Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

3.13.3 Contractor will abide by all applicable rules and regulations of Owner with respect to conduct, including smoking, parking of vehicles, security regulations and entry into adjacent facilities owned by Owner.

3.13.4 Contractor shall provide access to residents and businesses affected by the construction of this Project to the greatest extent possible, including providing temporary base and asphalt as needed.

3.13.5 Contractor shall erect and maintain on Site a Project Bulletin Board, accessible to all Contractor and Subcontractor employees, upon which Contractor shall post and maintain, throughout the Project's duration, all employment and safety information required by law and Contractor shall include information listing

Contractor's bonding and insurance agencies/providers, to include agency contact names, address and telephone numbers.

3.13.6 As applicable, Owner will have appropriate Temporary Bench Marks (hereafter referred to as "TBM") and a baseline (for both horizontal and vertical projects, as applicable) established. As of the date of the Notice To Proceed, it will be Contractor's responsibility to protect, preserve and reestablish (if required) the TBM and/or baseline. Construction staking and tolerances shall be in accordance with the "Manual of Practice for Land Surveying in the State of Texas Category 5".

3.13.7 As applicable, Contractor shall layout its work from an established baseline and TBM indicated on the drawings and shall be responsible for all measurements in connection with the layout. Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials and labor required to layout any part of the work. Contractor shall provide cut sheets to Owner's inspector at minimum seven (7) calendar days prior to construction of street and drainage work. Contractor shall establish the necessary offsets, hubs and guards marked showing control designation and offsets for SAWS Work, if present. Contractor shall provide cut sheets for improvements where Sewer profiles are provided for various phases of the project and cut sheets for Water profiles, if applicable. Contractor shall provide staking and preparation of cut sheets after receiving notice to proceed from Owner. If present, Contractor shall provide SAWS with cut sheets at minimum (7) calendar days prior to commence of SAWS work. Contractor shall be responsible for maintaining and preserving a baseline and TBM indicated on the drawings for duration of construction. If such marks are destroyed, Contractor shall replace them at its own expense. At the end of construction of the Project, Contractor shall provide Owner a grade certificate prepared by a Registered Professional Land Surveyor. This certificate shall state that the infrastructure is constructed in accordance to the construction documents or as approved by Owner and the Engineer of Record, which is noted on the record plan set.

3.14 CUTTING AND PATCHING

3.14.1 Contractor shall be responsible for all cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

3.14.2 Contractor shall not damage or endanger a portion of the Work or a fully or partially completed construction by either Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. Contractor shall not cut or otherwise alter such construction by Owner or a separate contractor except with written consent of Owner and, if Owner so designates, of such separate contractor and said consent shall not be unreasonably withheld. Contractor unreasonably shall not withhold from Owner or a Owner's separate contractor Contractor's consent to cutting or otherwise altering the Work.

3.14.3 Any part of the Work damaged by Contractor, either during installation or prior to Substantial Completion of the Work (or such earlier date established in **Section 9.9** herein), shall be repaired by Contractor so as to be equal in quality, appearance, serviceability and other respects to an undamaged item or part of the Work. Where this repair cannot fully be accomplished, a damaged item or part shall be replaced by Contactor.

3.15 CLEANING UP

3.15.1 During the progress of the Work, Contractor shall keep the Project Site and surrounding area including, but not limited to, creeks, drainage channels, easements and private property free from accumulations of waste materials, rubbish and other debris resulting from the Work. As applicable, Contractor shall clean, sweep, mop, brush and polish, as appropriate, the interior of the improvements and/or renovated areas including, but not limited to, any floors, carpeting, ducts, fixtures and ventilation units operated during construction, and shall clean exterior gutters, drainage, walkways, driveways and roofs of debris. If Contractor fails to clean up as provided in the Contract Documents, Owner may elect to do so and all costs incurred by Owner shall be paid by Contractor.

3.15.2 Prior to Substantial Completion of the Work, Contractor shall remove all waste materials, rubbish and debris from and about the premises, as well as all tools, appliances, construction equipment and machinery and surplus materials, and shall leave the Project Site clean and ready for occupancy by Owner. As applicable, Contractor shall clean, sweep, mop, brush and polish, to Owner's satisfaction, the interior of the improvements and/or renovated areas including, but not limited to, any floors, carpeting, ducts, fixtures and ventilation units operated during construction, and shall clean exterior gutters, drainage, walkways, driveways and roofs of debris. Contractor shall restore to their original condition those portions of the Site not designated for alteration by the Contract Documents. If Contractor fails to clean up the premises as provided in the Contract Documents, Owner may elect to do so and all costs incurred by Owner shall be paid by Contractor.

3.16 ACCESS TO WORK. Contractor shall provide Owner and Design Consultant access to Work in preparation and in progress, wherever located.

3.17 PATENT FEES AND ROYALTIES. Contractor shall pay all license fees and royalties and assume all costs incident to the use of the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner its use is subject to patent rights or copyrights calling

for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

3.18 INDEMNITY PROVISIONS

3.18.1 Contractor covenants and agrees to **HOLD HARMLESS AND UNCONDITIONALLY INDEMNIFY, PROTECT AND DEFEND** Owner, its elected officials, employees, officers, directors, volunteers and representatives of Owner, individually or collectively, from and against any and all third party claims, demands, actions, liabilities, liens, losses, damages, costs and expenses, of every kind and character whatsoever, including without limitation by enumeration the amount of any judgment, penalty, interest, court costs and reasonable legal fees incurred in connection with the same, or the defense thereof, for or in connection with loss of life or personal injury (including employees of Contractor and of Owner) damage to property (other than the Work itself and including property of Contractor and of Owner), but only to the extent caused by the negligent acts or omissions of, or incident to or in connection with or resulting from the negligent acts or omissions of, Contractor, its agents, servants, employees or its Subcontractors and their agents, servants and employees, in connection with the Work to be performed, services to be rendered or materials to be furnished under this Contract. Notwithstanding anything to the contrary included herein, in no event shall Contractor be liable for claims arising out of accidents resulting from the sole negligence of Owner, all without however, waiving any governmental immunity available to Owner under Texas Law and without waiving any defenses of the parties under Texas Law.

3.18.2 In addition to the above, Contractor also covenants and agrees to **HOLD HARMLESS AND UNCONDITIONALLY INDEMNIFY, PROTECT AND DEFEND** Owner, its elected officials, employees, officers, directors, volunteers and representatives of Owner, individually or collectively, from and against any and all third party claims, demands, actions, liabilities, liens, losses, damages, costs and expenses of every kind and character whatsoever, including, without limitation by enumeration, the amount of any judgment, penalty, interest, court costs and reasonable legal fees incurred in connection with the same, or the defense thereof, for or in connection with loss of life or personal injury (including employees of Contractor and of Owner) damage to property (other than the Work itself and including property of Contractor and of Owner), but only to the extent caused by the intentional or deliberate misconduct, grossly negligent, willful acts or omissions of Contractor, its agents, servants, employees, or its Subcontractors and their agents, servants and employees, or in connection with the Work to be performed, services to be rendered or materials to be furnished under this Contract, including but not limited to violations of any statute, regulation, ordinance or provision of this Contract. Notwithstanding anything to the contrary included herein, in no event shall Contractor be liable for claims arising out of accidents resulting from the sole negligence of Owner, all without however, waiving any governmental immunity available to Owner under Texas Law and without waiving any defenses of the parties under Texas Law.

3.18.3 **INTELLECTUAL PROPERTY INDEMNIFICATION.** Contractor shall protect, indemnify, and defend and/or handle at its own cost and expense any claim or action against Owner, its elected officials, employees, officers, directors, volunteers and representatives of Owner, individually or collectively, for infringement of any United States Patent, copyright or similar property right including, but not limited to, misappropriation of trade secrets and any infringement by Contractor and its employee or its Subcontractors and their agents, servants and employees, based on any deliverable or any other materials furnished hereunder by Contractor and used by either Owner or Contractor within the scope of this Agreement (unless said infringement results directly from Contractor's compliance with City's written standards or specifications). Contractor does not warrant against infringement by reason of Owner's or Design Consultant's design of articles or their use in combination with other materials or in the operation of any process. Contractor shall have the sole right to conduct the defense of any such claim or action and all negotiations for its settlement or compromise, unless otherwise mutually agreed upon, expressed in writing and signed by the parties hereto. Contractor agrees to consult with Owner's City Attorney during such defense or negotiations and make good faith efforts to avoid any position adverse to the interest of Owner. Owner will make available to Contractor any deliverables and/or works made for hire by Contractor necessary to the defense of Contractor against any claim of infringement for the duration of Contractor's legal defense.

3.18.4 If such infringement claim or action has occurred or, in Contractor's judgment, is likely to occur, Owner shall allow Contractor, at Contractor's option and expense, (unless such infringement results directly from Contractor's compliance with Owners written standards or specifications or by reason of Owner's or Design Consultants' design of articles or their use in combination with other materials or in the operation of any process for which the City shall be liable) to elect to:

(1) procure for Owner the right to continue using said deliverable and/or materials;

(2) modify such deliverable and/or materials to become non-infringing (provided that such modification does not adversely affect Owner's intended use of the deliverable and/or materials as contemplated hereunder);

(3) replace said deliverable and/or materials with an equally suitable, compatible and functionally equivalent non-infringing deliverable and/or materials at no additional charge to Owner; or

(4) if none of the foregoing alternatives is reasonably available to Contractor, upon written request, Owner shall return the deliverable and/or materials in question to Contractor and Contractor shall refund all monies paid by Owner, with respect to such deliverable and/or materials, and accept return of same. If any such cure provided for in this **Section 3.18** shall fail to satisfy the third-party claimant, these actions shall not relieve

Contractor from its defense and indemnity obligations set forth in this **Section 3.18**.

3.18.5 The indemnification obligations under this **Section 3.18** shall not be limited in any way by the limits of any insurance coverage or any limitation on the amount or type of damages, compensation or benefits payable by, for or to Contractor or any Subcontractor, supplier or any other individual or entity under any insurance policy, workers' compensation acts, disability benefit acts or other employee benefits acts.

3.18.6 **WORKMEN SAFETY.** The Indemnification hereunder shall include, without limiting the generality of the foregoing, liability which could arise to Owner, its agents, consultants and/or representatives or Design Consultant pursuant to State statutes for the safety of workmen and, in addition, all Federal statutes and rules existing there under for protection, occupational safety and health to workmen. It is agreed that the primary obligation of Contractor is to comply with these statutes in the performance by Contractor of the Work and that the obligations of Owner, its agents, consultants and representatives under said statutes are secondary to that of Contractor.

3.18.7 **OTHER PROVISIONS REGARDING INDEMNITY**

3.18.7.1 The provisions of this Indemnification solely are for the benefit of the Parties hereto and are not intended to create or grant any rights, contractual or otherwise, to any other person or entity.

3.18.7.2 The indemnities contained herein shall survive the termination of this Contract for any reason whatsoever.

3.18.7.3 Contractor shall, within twenty-one (21) calendar days, advise Owner in writing of any potential or actual claim or demand against Owner or Contractor, as the case may be, known to Contractor and related to or arising out of Contractor's activities under this Contract and Contractor shall see to the investigation and defense of such claim or demand at Contractor's sole cost. Owner shall have the right, at its option and at its own expense, to participate in such defense without relieving Contractor of any of its obligations under this **Section 3.18**.

3.18.8 **DEFENSE COUNSEL.** Owner shall have the right to approve defense counsel, of which approval shall not be unreasonably withheld, to be retained by Contractor in fulfilling its obligation hereunder to defend and indemnify Owner, unless such right is expressly waived by Owner in writing. Contractor shall retain Owner-approved defense counsel within ten (10) calendar days of Owner's written notice that Owner is invoking its right to Indemnification under this Contract. If Contractor fails to retain counsel within such time period, Owner shall have the right to retain defense counsel on its own behalf and Contractor shall be liable for

all costs incurred by Owner. Owner also shall have the right, at its option, to be represented by advisory counsel of its own selection and at its own expense, without waiving the foregoing.

3.19 REPRESENTATIONS AND WARRANTIES. Contractor represents and warrants the following to Owner (in addition to the other representations and warranties contained in the Contract Documents), as an inducement to Owner to execute this Contract, which representations and warranties shall survive the execution and delivery of the Contract and the Final Completion of the Work, that Contractor:

3.19.1 is financially solvent, able to pay its debts as they mature and possessed of sufficient working capital to complete the Work and perform its obligations under the Contract Documents;

3.19.2 is able to furnish the plant, tools, materials, supplies, equipment and labor required to complete the Work and perform its obligations hereunder and has sufficient experience and competence to do so;

3.19.3 is authorized to do business in the State of Texas and properly is licensed by all necessary governmental, public and quasi-public authorities having jurisdiction over it, the Work and the site of the Project;

3.19.4 is acting within its duly authorized powers to execute this Contract and execute the performance and obligations thereof; and

3.19.5 had directed its duly authorized representative(s) to visit the Site of the Work, familiarize itself with the local conditions under which the Work is to be performed and correlated its observations with the requirements of the Contract Documents.

3.20 **BUSINESS STANDARDS.** Contractor, in performing it's obligations under this Contract, shall establish and maintain appropriate business standards, procedures and controls, including those necessary to avoid any real or apparent impropriety or adverse impact on the interest of Owner or affiliates. Contractor shall review with Owner, at a reasonable frequency during the performance of the Work hereunder, such business standards and procedures including, without limitation, those related to the activities of Contractor's employees, Subcontractors and agents in their relations with Owner's employees, consultants, agents, representatives, vendors, Subcontractors, other third parties and those relating to the placement and administration of purchase orders and subcontracts.

ARTICLE IV. ADMINISTRATION OF THE CONTRACT

4.1 DESIGN CONSULTANT. A Design Consultant is a person registered as an Architect pursuant to Tex. Occupations Code Ann., Chapter 1051, as a Landscape Architect pursuant to Texas Occupations Code, Chapter 1052, and/or a person licensed as a professional Engineer pursuant to Texas Occupations Code, Chapter 1001, or a firm employed by Owner to provide professional architectural or engineering services and exercising overall

responsibility for the design of a Project or a significant portion thereof, and performing certain contract administration responsibilities as set forth in its Contract and these General Conditions. If the employment of a Design Consultant is terminated, Owner shall employ a new Design Consultant whose status under the Contract Documents shall be that of the former Design Consultant.

4.2 ROLES IN ADMINISTRATION OF THE CONTRACT

4.2.1 Owner and Design Consultant will provide administration of the Contract, as described in the Contract Documents, and Design Consultant will be Owner's representative:

(1) during construction;

(2) until final payment is due; and

(3) with Owner's concurrence, from time to time during the one-year period for correction of Work described in **Article XII** herein.

Design Consultant only will have authority to act on behalf of Owner to the extent provided in the Contract Documents, unless otherwise modified in writing by Owner in accordance with other provisions of the Contract Documents.

4.2.2 Owner's instruction to Contractor may be issued through Design Consultant and Owner reserves the right to issue instructions directly to Contractor or through other designated Owner representatives. Contractor understands that Owner may modify the authority of such Design Consultant as provided in the terms of its contractual relationship with Design Consultant, and Owner shall, in such event, be vested with powers formerly exercised by such Design Consultant, provided written notice of such modification immediately shall be served on Contractor. Nothing herein shall authorize independent agreements between Contractor and Design Consultant, nor shall Design Consultant be deemed to have a legal relationship with Contractor.

4.2.3 Neither Design Consultant nor Owner will have control over, charge of nor be responsible for the construction means, methods or techniques, or for the safety precautions, quality control program and other programs in connection with the Work, since these solely are Contractor's rights and responsibilities under the Contract Documents. Sequencing and procedures will be coordinated and agreed upon by Owner, Design Consultant and Contractor.

4.2.4 Design Consultant will not be responsible for Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. Design Consultant will not have control over, charge of and will not be responsible for acts or omissions of Contractor, Subcontractor, their respective agents, employees or any other persons or entities performing portions of the Work.

4.2.5 Owner and Contractor shall endeavor to communicate with each other directly, through Design Consultant and/or through the ODR about matters arising out of or relating to the Contract. Communications by and with Design Consultant's consultants shall be through Design Consultant. Communications by Owner and Design Consultant with Contractor's employees Subcontractors and material suppliers shall be through Contractor. All communications by and with Owner's separate contractors shall be through Owner.

4.2.6 Design Consultant will review and approve or take other appropriate action upon Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. Design Consultant will perform these reviews in a timely fashion so as to not delay the Work. Design Consultant promptly will respond to submittals such as Shop Drawings, Product Data and Samples pursuant to the procedures set forth in the Project Specifications. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of equipment or systems, all of which remain the responsibility of Contractor as required by the Contract Documents. Design Consultant's review of Contractor's submittals shall not relieve the Contractor of the obligations under **Sections 3.3, 3.5** and **3.12** herein. Design Consultant's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by Design Consultant, any construction means, methods, techniques, sequences or procedures. Design Consultant's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

4.2.7 Upon written request of Owner or Contractor, Design Consultant will issue its interpretation of the requirements of the plans and specifications. Design Consultant's response to such requests will be made in writing within a time limit agreed upon or otherwise with reasonable promptness. If no agreement is made concerning the time within which interpretations required of Design Consultant shall be furnished in compliance with this **Section 4.2**, then no delay will be recognized on account of any failure by Design Consultant to furnish such interpretations except for actual substantiated delays, for which Contractor is not responsible, occurring more than fifteen (15) calendar days after written request is made for the interpretations.

4.2.8 Interpretations and decisions of Design Consultant will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings.

4.2.9 Design Consultant's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents and not expressly overruled in writing by Owner.

4.3 CLAIMS AND DISPUTES

4.3.1 **DEFINITION.** A Claim is a demand or assertion by one of the parties seeking, as a matter of right, an adjustment or interpretation of Contract terms, payment of money, extension of time or other relief, with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between Owner and Contractor arising out of or relating to the Contract. Claims must be initiated by written notice. Except as contemplated by **Section 8.2** herein, every Claim of Contractor, whether for additional compensation, additional time or other relief including, but not limited to, claims arising from concealed conditions, shall be signed and sworn to by an authorized corporate officer (if not a corporation, then an official of the company authorized to bind Contractor by his/her signature) of Contractor, verifying the truth and accuracy of the Claim. The responsibility to substantiate a Claim shall rest with the party making the Claim.

4.3.2 **TIME LIMIT ON CLAIMS.** Except for those Claims resulting from unusually severe weather, as addressed in **Section 4.3.6** herein, Contractor Claims must be initiated within fifteen (15) calendar days after occurrence of the event giving rise to such Claim. Claims by Contractor must be submitted by written notice to both Owner and Design Consultant. Claims by Owner must be submitted by written notice to Contractor. Failure by Contractor to submit written notice of the claim within fifteen (15) calendar days shall constitute a waiver of such claim.

4.3.3 **CONTINUING CONTRACT PERFORMANCE.** Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in **Sections 4.5.1, Section 9.7.1** and **Article 14** herein, Contractor shall proceed diligently with performance of the Contract and Owner shall continue to make payments in accordance with the Contract Documents.

4.3.4 **CLAIMS FOR CONCEALED OR UNKNOWN CONDITIONS.** If conditions are encountered at the Site which either are subsurface or are otherwise concealed physical conditions which were not known to Contractor and which differ materially from those indicated in the Contract Documents or in the reports of investigations and tests of subsurface and latent physical conditions provided by Owner to Contractor prior to the preparation by Contractor of its Bid, as referred to above, or are unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents in the general vicinity of the Project site, then Contractor promptly shall notify Owner and Design Consultant of such conditions before conditions are disturbed, and in no event more than three (3) workdays after first observation of the conditions. Upon notification by Contractor, Design Consultant promptly will investigate such conditions and report its findings to Owner. If Owner and Contractor cannot agree on an adjustment to the Contract Sum or Contract Time, the adjustment shall be subject to dispute resolution pursuant to **Section 4.5** herein.

4.3.5 **CLAIMS FOR ADDITIONAL COST.** If Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided in this **Section 4.3** shall

be given and accepted by Owner before proceeding to execute the Work, provided that prior notice is not required for Claims relating to an emergency endangering life or property. Contractor shall file a Claim in accordance with this **Section 4.3** if Contractor believes additional cost is involved for reasons including, but not limited to:

(1) a written interpretation from Design Consultant;

(2) an order by Owner to stop the Work where Contractor was not at fault;

(3) a written order for a minor change in the Work issued by Design Consultant;

(4) failure of payment by Owner;

(5) termination of the Contract by Owner for convenience;

(6) Owner's suspension; or

(7) other reasonable grounds.

4.3.6 **CLAIMS FOR ADDITIONAL TIME**

4.3.6.1 If Contractor wishes to make Claim for an increase in the Contract Time, written notice, as required in this **Section 4.3**, shall be given. Contractor's Claim shall include an estimate of probable impact of delay on progress of the Work in accordance with **Section 3.10.11** herein. In the case of a continuing delay, only one Claim is necessary.

4.3.6.2 Contractor shall be entitled to an extension of the Contract Time for delays or disruptions due to unusually severe weather in excess of that normally experienced at the job site, as determined from climatological data set forth by National Weather Service and which affects the Project's critical path. Contractor shall bear the entire economic risk of all weather delays and disruptions. Contractor shall not be entitled to any increase in the Contract Sum by reason of such delays or disruptions. With regard to Vertical projects with Owner, requests for an extension of time, pursuant to this **Section 4.3.6**, shall be submitted to Owner and Design Consultant not later than the fifteenth (15^{th}) calendar day of the month following the month during which the delays or disruptions occurred and shall include documentation and all details reasonably available, demonstrating the nature and duration of the delays or disruptions and their effect on the critical path of the Schedule. With regard to Horizontal projects with Owner, upon Contractor reaching Substantial Completion, Owner and Contractor will look back at the entire duration of the calendar day Project and review the totality of what Contractor claims were unusually severe weather disruptions. If the Project was delayed or disrupted due to unusually severe weather in excess of that normally experienced over the

entire duration of the Project, Contractor may make a Claim for an extension of the Contract Time for delays or disruptions due to unusually severe weather in excess of that normally experienced at the job site, as determined from climatological data set forth by National Weather Service and which affects the Project's critical path. Any time extension granted to Contractor for either Vertical or Horizontal projects under **Section 4.3.6** shall be non-compensatory.

4.3.7 **INJURY OR DAMAGE TO PERSON OR PROPERTY.** If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party or an act or omission of others for whose acts such other party legally is responsible (including, with respect to Owner, the acts or omissions of Owner's separate contractors), written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding three (3) calendar days after the discovery of the injury or damage. The written notice shall provide sufficient detail to enable the other party to investigate the injury or damage.

4.3.8 **CHANGE IN UNIT PRICES.** As applicable, if unit prices are stated in the Contract Documents or subsequently agreed upon by Owner and Contractor and if quantities originally contemplated are materially changed in a proposed Change Order or Field Work Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to Owner or Contractor, the applicable unit prices shall be equitably adjusted.

4.3.9 **CLAIMS FOR CONSEQUENTIAL DAMAGES.** Except as otherwise provided in this Contract, in calculating the amount of any Claim or any measure of damages for breach of contract (such provision to survive any termination following such breach), the following standards will apply both to Claims by Contractor and to Claims by Owner:

4.3.9.1 No consequential, indirect, incidental, punitive or exemplary damages will be allowed, whether or not foreseeable, regardless of whether based on breach of contract, tort (including negligence), indemnity, strict liability or other bases of liability.

4.3.9.2 No recovery shall be based on a comparison of planned expenditures to total actual expenditures, on estimated losses of labor efficiency, on a comparison of planned manloading to actual manloading or on any other similar analysis that is used to show total cost or other damages.

4.3.9.3 Damages are limited to extra costs specifically shown to directly have been caused by a proven wrong for which the other party is claimed to be responsible.

4.3.9.4 The maximum amount of any recovery for delay, to the extent damages for delay are not otherwise disallowed by the terms of the Contract Documents, shall be as is provided in **Article VIII** herein.

4.3.9.5 No damages will be allowed for home office overhead or other home office charges or any Eichleay formula calculation, except or unless as expressly authorized by the Contract Documents.

4.3.9.6 No profit will be allowed on any damage Claim, except or unless as expressly authorized by the Contract Documents.

4.3.10 **SUBCONTRACTOR PASS-THROUGH CLAIMS.** In the event that any Subcontractor of Contractor asserts a Claim to Contractor that Contractor seeks to pass through to Owner under the Contract Documents, any entitlement to submit and assert the Claim as to Owner shall be subject to:

4.3.10.1 the requirements of **Section 4.3** herein of these General Conditions; and

4.3.10.2 the following additional three (3) requirements listed below, all three of said additional requirements shall be conditions precedent to the entitlement of Contractor to seek and assert such Claim against Owner:

(1) Contractor shall:

(a) have direct legal liability as a matter of contract, common law, or statutory law to Subcontractor for the claim that Subcontractor is asserting; or

(b) have entered into a written liquidating agreement with Subcontractor, prior to the Claim's occurrence, under which Contractor has agreed to be legally responsible to the Subcontractor for pursing the assertion of such Claim against Owner under said Contract and for paying to Subcontractor any amount that may be recovered, less Contractor's included markup (subject to the limits in the Contract Documents for any markup). The relationship, liability or responsibilities shall be identified in writing by Contractor to Owner at the time such Claim is submitted to Owner and a copy of any liquidating agreement shall be included by Contractor in the Claim submittal materials.

(2) Contractor shall have reviewed the Claim of the Subcontractor prior to its submittal to Owner and independently shall have evaluated such Claim in good faith to determine the extent to which the Claim is believed in good faith to be valid. Contractor shall inform Owner that Contractor has made a review, evaluation, and determination that the Claim is made in good faith and is believed to be valid.

(3) Subcontractor making the Claim to Contractor shall certify to both Contractor and Owner that it has compiled, reviewed and evaluated the merits of such Claim and that the Claim is believed in good faith by Subcontractor to be valid. A copy of the certification by Subcontractor shall be included by Contractor in the Claim submittal materials.

4.3.10.3 Any failure of Contractor to comply with any of the foregoing requirements and conditions precedent with regard to any such Claim shall constitute a waiver of any entitlement to submit or pursue such Claim.

4.3.10.4 Receipt and review of a Claim by Owner under this **Section 4.3** shall not be construed as a waiver of any defenses to the Claim available to Owner under the Contract Documents or at law.

4.3.11 **OWNER'S RIGHT TO ORDER ACCELERATION AND TO DENY CLAIMED AND APPROPRIATE TIME EXTENSIONS, IN WHOLE OR IN PART.** Contractor acknowledges and agrees that Substantial Completion of the Work by or before the Scheduled Completion Date is of substantial importance to Owner. The following provisions, therefore, will apply:

4.3.11.1 If Contractor falls behind the approved construction schedule for whatever reason, Owner shall have the right, in Owner's sole discretion, to order Contractor to develop a schedule recovery plan to alter its work sequences or to otherwise accelerate its progress in such a manner as to achieve Substantial Completion on or before the Contract Time completion date or such other date as Owner reasonably may direct. Upon receipt, Contractor shall take any and all action necessary to comply with Owner's order. In such event, any possible right, if any, of Contractor to additional compensation for any acceleration shall be subject to the terms of this **Section 4.3.11**.

4.3.11.2 In the event Owner agrees that Contractor is entitled to an extension of Contract Time and Contractor properly has initiated a Claim for a time extension in accordance with **Section 4.3(a)** herein, Owner shall have the right, in Owner's sole discretion, to deny any portion of Contractor's Claim for an extension of Contract Time and order Contractor to exercise its commercially reasonable efforts to achieve Substantial Completion on or before the date that would have been required, but for the existence of the event giving rise to the Claim, by giving written notice to Contractor provided within fourteen (14) calendar days after receipt of Contractor's Claim. If Owner denies Contractor's claim for an extension of Contract Time under this **Section 4.3.11**, either in whole or in part, Contractor shall proceed to prosecute the Work in such a manner as to achieve Substantial Completion on or before the then-existing Scheduled

Completion Date. If, after initiating good faith acceleration efforts and is it shown that, through no fault of Contractor, Contractor fell behind on the approved construction schedule and Contractor still is unable to achieve Substantial Completion within the originally scheduled Contract Time, Owner will not be entitled to liquidated damages. Nothing in this **Section 4.3.11.2** shall prohibit Contractor from filing a Claim for an extension of time Contractor feels it may be owed.

4.3.11.3 If Owner orders Contractor to accelerate the Work under **Section 4.3.11.2** herein, and Contractor would have been entitled to a time extension for a reason specifically allowed under the Contract Documents for an amount of time that would have justified approval by Owner if not for the need and right to complete the Project within the stipulated period, Contractor may initiate a Claim for schedule recovery or acceleration costs, pursuant to **Section 4.3.1** herein. Any resulting Claim for these costs properly initiated by Contractor under **Section 4.3.1** herein shall be limited to those reasonable and documented direct costs of labor, materials, equipment and supervision solely and directly attributable to the actual recovery or acceleration activity necessary for Contractor to bring the Work back within the then existing approved construction schedule. These direct costs of Contractor include, but are not limited to, the premium portion of overtime pay for additional crew, shift, or equipment costs, if requested in advance by Contractor and approved in writing by Owner. A percentage markup for the prorated cost of premium on the existing performance and payment bonds and required insurance, profit and field overhead, not to exceed the markups permitted by this Contract, will be allowed on the claimed costs. **NO OTHER MARKUP FOR PROFIT, OVERHEAD (INCLUDING, BUT NOT LIMITED TO, HOME OFFICE OVERHEAD) OR ANY OTHER COSTS WILL BE ALLOWED ON ANY ACCELERATION CLAIM**. Owner shall not be liable for any costs related to an acceleration claim other than those described in this **Section 4.3.11**.

4.3.12 **NO WAIVER OF GOVERNMENTAL IMMUNITY.** Nothing in this contract shall be construed to waive Owner's Governmental Immunity from a lawsuit, which Immunity is expressly retained to the extent it is not clearly and unambiguously waived by State law.

4.4 RESOLUTION OF CLAIMS AND DISPUTES

4.4.1 Claims by Contractor against Owner and Claims by Owner against Contractor, including those alleging an error or omission by Design Consultant but excluding those arising under **Section 10.3** and **Section 10.5** herein, shall be referred initially to Design Consultant for consideration and recommendation to Owner.

4.4.2 An initial recommendation by Design Consultant shall be required as a condition precedent to mediation or litigation of all Claims by the parties arising prior to the date final payment is due, unless thirty (30) calendar days have passed after the

Claim has been referred to Design Consultant with no recommendation having been rendered by Design Consultant.

4.4.3 Design Consultant will review Claims and, within ten (10) work days of receipt of a Claim, take one or more of the following actions:

(1) request additional supporting data from the party making the Claim;

(2) issue an initial recommendation;

(3) suggest a compromise; or

(4) advise the parties that Design Consultant is unable to issue an initial Recommendation, due to a lack of sufficient information or conflict of interest.

4.4.4 Following receipt of Design Consultant's initial recommendation regarding a Claim, Owner and Contractor shall attempt to reach agreement as to any adjustment to the Contract Sum and/or Contract Time. If no agreement is reached, either party may request mediation of the dispute, pursuant to **Section 4.5** herein.

4.4.5 If Design Consultant requests either or any party to provide a response to a Claim or to furnish additional supporting data, such requested party shall provide a response or the requested supporting data to Design Consultant, advise Design Consultant when the response or supporting data will be furnished or advise Design Consultant that no response of supporting data will be furnished.

4.4.6 With receipt of all information requested by Design Consultant, Design Consultant shall review the Claim and all received information within ten (10) calendar days of receipt of the information and shall take one of the following actions:

(1) issue a recommendation;

(2) suggest a compromise; or

(3) advise the parties Design Consultant is unable to issue a recommendation due to lack information or conflict of interest.

4.4.7 Upon Design Consultant's action or inaction, the two parties may agree to accept recommendations made by either party or may request mediation of the dispute pursuant to **Section 4.5** herein.

4.4.8 **WAIVER OF LIEN.** It is understood that, by virtue of this Contract, no mechanic, contractor, material man, artisan or laborer, whether skilled or unskilled, ever shall, in any manner, have a claim or acquire any lien upon the building or any of

the improvements of whatever nature or kind so erected or to be erected by virtue of this Contract, nor upon any of the land upon which said building or any of the improvements are so erected, built or situated.

4.5 ALTERNATIVE DISPUTE RESOLUTION

4.5.1 **CONTINUATION OF WORK PENDING DISPUTE RESOLUTION.** Each party is required to continue to perform its obligations under this Contract pending the final resolution of any dispute arising out of or relating to this Contract, unless it would be impossible or impracticable under the circumstances then present.

4.5.2 **REQUIREMENT FOR SENIOR LEVEL NEGOTIATIONS.** Before invoking mediation or any other alternative dispute process set forth herein, the parties to this Contract agree that they first shall try to resolve any dispute arising out of or related to this Contract through discussions directly between those senior management representatives within their respective organizations who have overall managerial responsibility for similar projects. Both Owner and Contractor agree that this step shall be a condition precedent to use of any other alternative dispute resolution process. If the parties' senior management representatives cannot resolve the dispute within thirty (30) calendar days after a party delivers a written notice of such dispute to the other, then the parties shall proceed with the alternative dispute resolution process contained in **Section 4.5** herein, including mediation and/or litigation. All negotiations pursuant to this **Section 4.5** are confidential and shall be treated as compromise and settlement negotiations for purposes of applicable rules of evidence.

4.5.3 **MEDIATION.** In the event that Owner and/or Contractor contend that the other has committed a material breach of this Contract, or the two parties can not reach a resolution of a claim or dispute pursuant to **Section 4.4** herein, as a condition preceding to filing a lawsuit, either party shall request mediation of the dispute with the following requirements:

4.5.3.1 Request for mediation shall be in writing, and shall request that the mediation commence not less than thirty (30) or more than ninety (90) calendar days following the date of the request, except upon agreement of both parties.

4.5.3.2 In the event Owner and Contractor are unable to agree to a date for the mediation or to the identity of the mediator(s) within thirty (30) calendar days following the date of the request for mediation, all conditions precedent in this **Section 4.5** shall be deemed to have occurred.

4.5.3.3 The parties shall share the mediator's fee and any mediation filing fees equally. Venue for any mediation or lawsuit arising under this Contract shall be in Bexar County, Texas. Any agreement reached in mediation shall be enforceable as a settlement agreement in any court having

jurisdiction thereof. No provision of this Contract shall waive any immunity or defense. No provision of this Contract is consent to a suit.

4.6 INTERNET-BASED PROJECT MANAGEMENT SYSTEMS. At its option, Owner may administer its design and construction management through an Internet-based Project Management system. In such cases, Contractor shall conduct communication through this medium and perform all Project-related functions utilizing this management system, to include all correspondences, submittals, Requests for Information, vouchers, payment requests and processing, Amendments, Change Orders and other administrative activities. When such a management system is employed, Owner shall administer the software, provide training to Project Team Members and shall make the software accessible via the Internet to all Project Team Members.

ARTICLE V. SUBCONTRACTORS

5.1 DEFINITION

A Subcontractor is a person or entity that has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of Subcontractor. The term "Subcontractor" does not include a separate contractor or Subcontractor of a separate contractor.

5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 Contractor shall, prior to entering into an agreement with such Subcontractor, notify Owner in writing of the names of all proposed first-tier Subcontractors for the Work.

5.2.2 Contractor shall not employ any Subcontractor or other person or organization (including those who are to furnish the principal items of materials or equipment), whether initially or as a substitute, against whom Owner may have reasonable objection. A Subcontractor or other person or organization identified in writing to Owner, prior to the Notice of Award and not objected to in writing by Owner prior to the Notice of Award, will be deemed acceptable to Owner. Acceptance of any Subcontractor, other person or organization by Owner shall not constitute a waiver of any right of Owner to reject defective Work. If Owner, after due investigation, has reasonable objection to any Subcontractor, other person or organization proposed by Contractor after the Notice of Award, Contractor will be required to submit an acceptable substitute. Contractor shall not be required to employ any Subcontractor, other person or organization against whom Contractor has reasonable objection.

5.2.3 Contractor fully shall be responsible to Owner for all acts and omissions of its Subcontractors, persons and organizations directly or indirectly employed by them and persons and organizations for whose acts any of them may be liable to the same extent that Contractor is responsible for the acts and omissions of persons

directly employed by Contractor. Nothing in the Contract Documents shall create any contractual relationship between Owner and any Subcontractor or other person or organization having a direct contract with Contractor, nor shall it create any obligation on the part of Owner to pay or to see to the payment of any moneys due any Subcontractor or other person or organization, except as may otherwise be required by law. Owner may furnish to any Subcontractor or other person or organization, to the extent practicable, evidence of amounts paid to Contractor on account of specific Work done.

5.2.4 The divisions and sections of the Specifications, as well as the identifications of any Drawings, shall not control Contractor in dividing the Work among Subcontractors or delineating the Work to be performed by any specific trade.

5.2.5 All Work performed for Contractor by a Subcontractor will be performed pursuant to an appropriate agreement between Contractor and Subcontractor which specifically binds Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of Owner.

5.2.6 **SBEDA/DBE REPORTING AND AUDITING.** During the term of the contract, Contractor must report the actual payments to all SBEDA or DBE (as applicable) Subcontractors and Suppliers in the time intervals and format prescribed by Owner. Owner reserves the right, at any time during the term of this Contract, to request additional information, documentation or verification of payments made to such Subcontractors and suppliers in connection with this Contract. Verification of amounts being reported may take the form of requesting copies of canceled checks paid to SBEDA or DBE Subcontractors and suppliers and/or confirmation inquiries directly to the SBEDA or DBE participants. Proof of payments, such as copies of canceled checks, properly must identify the Project name or Project number to substantiate a SBEDA or DBE payment for the Project.

5.2.7 **SMALL BUSINESS SUBCONTRACTOR SUBSTITUTIONS.** Reference SBEDA or DBE Requirements in Supplementary Conditions for Substitution of Subcontractors. Failure to follow such procedures is an event of default under this Contract and may be grounds for termination.

5.3 SUB-CONTRACTUAL RELATIONS

5.3.1 By appropriate agreement, written where legally required for validity, Contractor shall require each Subcontractor, to the extent of the Work to be performed by Subcontractor, to be bound to the Contractor by terms of the Contract Documents and to assume toward Contractor all the obligations and responsibilities, including the responsibility for safety of Subcontractor's Work and workers, which Contractor, by these Documents, assumes toward Owner and Design Consultant. Each Subcontractor agreement shall preserve and protect the rights of Owner and Design Consultant under the Contract Documents, with respect to the Work to be performed by Subcontractor, so that subcontracting thereof will not prejudice such rights. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with Sub-Subcontractors. Contractor shall make available

to each proposed Subcontractor, prior to the execution of all Subcontractor agreement(s), copies of the Contract Documents to which Subcontractor(s) will be bound. Subcontractors similarly will make copies of applicable portions of such documents available to their respective proposed Sub-Subcontractors.

5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

Each Subcontractor agreement for a portion of the Work assigned by Contractor to Owner shall provided that:

5.4.1 assignment is effective only after termination of the Contract by Owner and only for those Subcontractor agreements which Owner accepts by notifying Subcontractor and Contractor in writing; and

5.4.2 assignment is subject to the prior rights of the Surety, if any, obligated under bond relating to the Contract.

5.4.3 upon any such assignment, if the Work has been suspended for more than thirty (30) calendar days, Subcontractor's compensation equally shall be adjusted for increase in cost resulting from the suspension.

ARTICLE VI. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTS

6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

6.1.1 Owner reserves the right to perform construction or operations related to the Project with Owner's own forces and to award separate contracts in connection with other portions of the Project or other construction or operations on the Site under General Conditions of the Contract identical or substantially similar to these. If Contractor claims that a delay or additional cost is involved, due to such action by Owner, Contractor shall make a Claim as provided in **Section 4.3** herein.

6.1.2 When separate contracts are awarded for different portions of the Project or for other construction or operations on the Project Site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor that executes each separate Owner-Contractor Agreement.

6.1.3 Owner shall provide for coordination of the activities of Owner's own forces and of each separate contractor with the Work of Contractor and Contractor fully shall cooperate with said coordination. Contractor shall participate with other separate contractors and Owner in reviewing all construction schedules when directed by Owner to do so. Contractor shall make any revisions to its construction schedule deemed necessary after said joint review and mutual agreement. The revised construction schedules then shall constitute the schedules to be used by Contractor, separate contractors and Owner until subsequently revised.

6.1.4 Unless otherwise provided in the Contract Documents, when Owner and Owner's own forces perform construction or operation related to the Project, Owner shall be subject to the same obligations and to have the same rights that apply to Contractor under these General Conditions and the Contract Documents.

6.2 MUTUAL RESPONSIBILITY

6.2.1 Contractor shall afford Owner and Owner's separate contractor(s) reasonable opportunity for the introduction and storage of materials and equipment, the performance of their activities and the coordination of Contractor's construction and operations with theirs, as required by the Contract Documents.

6.2.2 If part of Contractor's Work depends, for proper execution or results, upon the construction or operations by Owner or a separate contractor, Contractor shall, prior to proceeding with that portion of the Work, promptly report to Owner apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of Contractor to so report shall constitute an acknowledgment that Owner's separate contractor's completed or partially completed construction is fit and proper to receive Contractor's Work, except as to defects not then reasonably discoverable.

6.2.3 Owner shall be reimbursed by Contractor for costs incurred by Owner which are payable to a separate contractor because of delays, improperly timed activities or defective construction of Contractor. Owner shall be responsible to Contractor for costs incurred by Contractor because of delays, improperly timed activities and damage to the Work or defective construction of Owner's separate contractor(s).

6.2.4 Contractor promptly shall remedy any damage wrongfully caused by Contractor or its Subcontractor(s) to any completed or partially completed construction or to property of Owner or Owner's separate contractor(s), as provided in **Section 10.2.5** herein.

6.2.5 Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for Contractor in **Section 3.14** herein.

6.3 OWNER'S RIGHT TO CLEAN UP. If a dispute arises among or between Contractor, Owner's separate contractor(s) and Owner, as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, Owner may clean up and those costs will be allocated amongst those parties responsible.

ARTICLE VII. CHANGES IN THE WORK

7.1 GENERAL

7.1.1 Changes in the Work may be accomplished, after the execution of the Contract and without invalidating the Contract, by Change Order, Field Work Directive/Force

Account or order for a minor change in the Work that does not affect the Contract Time or the Contract Sum, subject to the limitations stated in this **Article VII** and elsewhere in the Contract Documents.

7.1.2 A Change Order shall be based upon agreement among the Owner and Contractor; a Field Work Directive requires a directive by Owner and, if necessary, Design Consultant and may or may not be agreed to by Contractor; and an order for a minor change in the Work that does not affect the Contract Time or the Contract Sum may be issued by Owner.

7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents and Contractor promptly shall proceed with the changed Work, unless otherwise provided in a Change Order, Field Work Directive or order for a minor change in the Work or in this **Article VII**.

7.1.4 Changes resulting from Change Orders, Field Work Directives or orders for minor changes shall be recorded by Contractor on the As-Built record documents.

7.2 CHANGE ORDERS

7.2.1 A Change Order is a written modification of the Contract signed by both Owner and Contractor (and approved by City Council, if required) that authorizes an addition, deletion or revision in the Work or an adjustment in the Contract Sum or the Contract Times and is issued on or after the Effective Date of the Agreement.

7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in **Section 7.3.4** herein.

7.2.3 Acceptance of a Change Order by Contractor shall constitute a full accord and satisfaction for any and all claims and costs of any kind, whether direct or indirect, including, but not limited to impact, delay or acceleration damages arising from the subject matter of the Change Order. Each Change Order shall be specific and final as to prices and any extensions of time, with no reservations or other provisions allowing for future additional money or time as a result of the particular changes identified and fully compensated in the Change Order**.** The execution of a Change Order by Contractor shall constitute conclusive evidence of Contractor's agreement to the ordered changes in the Work, cost and additional time, if any. This Contract, as amended, forever releases any Claim against Owner for additional time or compensation for matters relating to or arising out of or resulting from the Work included within or affected by the executed Change Order. This release of any Claim applies to Claims related to the cumulative impact of all Change Orders and to any Claim related to the effect of a change on unchanged Work.

7.2.4 Owner or Design Consultant will prepare Change Orders and Field Work Directives and will have authority to order minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time.

Such changes shall be effected by written order, which Contractor promptly shall carry out and record on the As-Built record documents.

7.2.5 Contractor and Subcontractors shall be entitled to include overhead and profit in any Change Order only as provided by Project Specifications.

7.3 FIELD WORK DIRECTIVES

7.3.1 A Field Work Directive is a written directive signed by Owner and, if necessary, Design Consultant directing a change in the Work prior to agreement on an adjustment, if any, in the Contract Sum or Contract time, or both. Owner may, by Field Work Directive and without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, with any changes to the Contract Sum and/or the Contract Time to be adjusted according to the terms of this **Section 7.3**.

7.3.2 A Field Work Directive shall be used in the absence of total agreement on the terms of a Change Order. Owner will issue a Field Work Directive to Contractor with a defined Not-To-Exceed dollar amount for the scope of Work defined.

7.3.3 Upon receipt of a Field Work Directive, Contractor promptly shall proceed with the change in the Work involved and, in writing, advise Owner of the Contractor's agreement or disagreement with the method, if any, provided in the Field Work Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.4 If the Field Work Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods, as applicable:

7.3.4.1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;

7.3.4.2 prices, including unit prices, stated in the Contract Documents or subsequently agreed upon;

7.3.4.3 cost to be determined in a manner agreed upon by Owner and Contractor and a mutually acceptable fixed or percentage fee; or

7.3.4.4 as provided in **Section 7.3.6** herein.

7.3.5 If Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall initially be determined by Design Consultant on the basis of reasonable costs and savings attributable to the change including, in case of an increase in the Contract Sum, as applicable, a reasonable allowance for overhead and profit. In such case, and also under **Section 7.3.4.**3 herein, Contractor shall keep and present, in such form as Owner may prescribe, an itemized and detailed accounting together with appropriate supporting data. Unless otherwise provided in the Contract

Documents, costs for the purposes of this **Section 7.3.5** shall be limited to the following:

7.3.5.1 costs of all labor, including social security, old age and unemployment insurance, fringe benefits required by Law, agreement or custom, and workers' compensation insurance;

7.3.5.2 costs of all materials, supplies and equipment, including cost of transportation, storage installation, maintenance, dismantling and removal, whether incorporated or consumed;

7.3.5.3 rental costs of all machinery and equipment, exclusive of hand tools, whether rented from Contractor or others, including costs of transportation, installation, minor repairs and replacements, dismantling and removal;

7.3.5.4 expenses incurred in accordance with Contractor's standard personnel policy for travel approved in writing by Owner in advance;

7.3.5.5 costs of premiums for all bonds and insurance, permit fees and allowable sales, use or similar taxes related to the Work;

7.3.5.6 all additional costs of supervision and field office personnel directly attributable to the change; and

7.3.5.7 all payments made by the Contractor to Subcontractors.

7.3.6 The amount of credit to be allowed by Contractor to Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost of the deleted or change Work, plus Contractor's allocated percent for profit and overhead, as confirmed by Design Consultant, subject to any equitable adjustment recommended by Design Consultant and approved by Owner. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase or decrease, if any, with respect to that change.

7.3.7 If Owner and Contractor agree with the determination made by Design Consultant concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

7.3.8 If Owner and Contractor can not reach an agreement on either an adjustment on the Contract Sum and Contract Time, pursuant to an issued Field Work Directive, Owner and Contractor shall execute a Change Order for the adjustment on the Contract Sum or Contract Time, if any, the parties do agree upon for the Work performed and Contractor reserves the right to file a Claim for any disagreements in Contract Sum or Contract Time not addressed in the Change Order, pursuant to

Section 4.4 herein. If Owner and Contractor can not agree on both the adjustment in the Contract Sum and the Contract Time associated with an issued Field Work Directive, Owner unilaterally shall file a Change Order listing Owner's adjustments in the Contract Sum and/or Contract Time and Contractor reserves the right to file a Claim for payment and/or time, pursuant to **Section 4.4** herein.

7.4 MINOR CHANGES TO THE WORK. Owner or Design Consultant shall have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on Owner and Contractor. Contractor promptly shall carry out such written orders and record such changes in the As-Built drawings.

7.5 TIME REQUIRED TO PROCESS CHANGE ORDERS

7.5.1 All responses by Contractor to proposal requests from Owner or Design Consultant shall be accompanied by a complete itemized breakdown of costs. Responses to proposal requests shall be submitted sufficiently in advance of the required work to allow Owner and Design Consultant a minimum of thirty (30) calendar days after receipt by Owner to review the itemized breakdown and to prepare or distribute additional documents as may be necessary. Each of Contractor's responses to proposal requests shall include a statement that the cost and additional time described and requested in Contractor's response represents the complete, total and final cost and additional Contract Time associated with the extra work, change, addition to, omission, deviation, substitution or other grounds for seeking extra compensation or additional time under the Contract Documents, without reservation or further recourse.

7.5.2 All Change Orders require written approval by either Owner or City Council or, where authorized by the state law and Owner ordinance, by Owner's City Manager or designee, pursuant to Administrative Action. The approval process requires a minimum of forty-five (45) calendar days after submission to Owner in final form with all supporting data. Receipt of a submission by Owner does not constitute acceptance or approval of a proposal, nor does it constitute a warranty that the proposal will be authorized by Owner or City Council Resolution or Administrative Action. **THE TIME REQUIRED FOR THE APPROVAL PROCESS SHALL NOT BE CONSIDERED A DELAY AND NO EXTENSIONS TO THE CONTRACT TIME OR INCREASE IN THE CONTRACT SUM WILL BE CONSIDERED OR GRANTED AS A RESULT OF THIS PROCESS.** Pending the approval of a Change Order as described above, Contractor will proceed with the work under a pending Change Order only if directed in writing to do so by Owner.

ARTICLE VIII. TIME

8.1 PROGRESS AND COMPLETION

8.1.1 **TIME LIMITS STATED IN THE CONTRACT DOCUMENTS ARE OF THE ESSENCE OF THE CONTRACT**. By executing the Contract, Contractor confirms that the Contract Time is a reasonable period for performing the Work.

8.1.2 Contractor shall proceed with the Work expeditiously using adequate forces and shall achieve Substantial Completion within the Contract Time.

8.1.3 Nothing in this **Article VIII** shall be construed as prohibiting Contractor from working on Saturdays if it so desires and giving Owner at least the prerequisite forty-eight (48) hours written notice of intent to perform Work on Saturday, Sunday and holidays so that Owner's representative may be scheduled to observe/inspect said Work and only if Contractor has performed work on the Project during the same week of the requested Saturday, Sunday or holiday.

8.2 DELAYS AND EXTENSIONS OF TIME

8.2.1 Neither Owner nor Contractor, except as provided for in this **Section 8.2**, shall be liable to the other for any delay to Contractor's Work by reason of fire, act of God, riot, strike or any other cause beyond Owner's control. Should any of these listed factors delay the Work's critical path, as evidenced by a Time Impact Analysis developed by Contractor and verified by Design Consultant, Program Manager and Owner, Contractor shall receive an extension of the Contract Times equal to the delay if a written claim is made within five (5) calendar days of the delaying event and granted by Owner. Under no circumstances shall Owner be liable to pay Contractor any compensation for such delays. Note that any request for an extension of time due to delays or disruption caused by unusually severe weather are addressed in **Section 4.3.6.2** herein.

8.2.2 Should Contractor be delayed solely by the act, negligence or default of Owner or Design Consultant, and should any of these factors delay the Project's critical path, as evidenced by a Time Impact Analysis developed by Contractor and verified by Design Consultant, Program Manager and Owner, Contractor shall receive an extension of the Contract Time equal to the verified delay or portion thereof if a written claim is made within five (5) calendar days of the act, negligence or default of Owner or Design Consultant and granted by Owner. In addition, Contractor, upon timely notice to Owner, with substantiation by Owner and Design Consultant and upon approval of Owner, shall be compensated for its Project facilities and field management expenses on a per diem basis (said per diem includes the costs incurred by Contractor to administer its Work and does not include costs associated for any tier of Subcontractor or supplier to administer their Work. Compensation for Subcontractor's and supplier's compensable delay affecting the Project critical path shall be separate and apart from the per diem cost due and payable to the Contractor) for the particular Project delayed and for the period of

the critical path delay attributable to the Owner-caused event. In no event will Contractor be entitled to home office or other off-site expenses or damages.

8.2.3 Claims relating to time shall be made in accordance with applicable provisions of **Section 4.3** herein.

8.2.4 This Contract does not permit the recovery of damages by Contractor for delay, disruption or acceleration, other than those described in **Section 8.2.2** herein, as provided under Section **4.3.11(3)** herein and those justified by a Time Impact Analysis. Contractor agrees that it fully shall be compensated for all delays solely by an extension of non-compensatory time or as contemplated in **Section 8.2.2** herein.

ARTICLE IX. PAYMENTS AND COMPLETION

9.1 CONTRACT SUM. The Contract Sum is stated in the Contract and, including authorized adjustments, is the total maximum not-to-exceed amount payable by Owner to Contractor for performance of the Work under the Contract Documents

9.2 SCHEDULE OF VALUES

9.2.1 A Schedule of Values for all of the Work shall be submitted by Contractor and shall include quantities and prices of items which, when added together, equal a contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Where applicable, overhead and profit shall be included as a separate line item.

9.2.2 Before the first Application for Payment, Contractor shall submit to Owner and Design Consultant a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as Owner and Design Consultant may require. This schedule, unless objected to by Design Consultant or Owner, shall be used as a basis for reviewing Contractor's Applications for Payment.

9.3 APPLICATIONS FOR PAYMENT

9.3.1 Contractor shall submit Applications for Payment to Owner electronically. Contractor shall electronically attach to its Application for Payment all data substantiating Contractor's right to payment as Owner or Design Consultant may require, such as copies of requisitions from Subcontractors and material suppliers reflecting retainage, if provided for in the Contract Documents, and reflecting a deduction for Liquidated Damages, if applicable. Applications for Payment shall not include requests for payment for portions of the Work which Contractor does not intend to pay to a Subcontractor or material supplier, unless such Work has been performed by others whom Contractor intends to pay.

9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the Site

for subsequent incorporation in the Work and verified by Owner. If approved in advance in writing by Owner, payment similarly may be made for materials and equipment suitably stored off the Site at a location agreed upon in writing and verified by Owner. Payment for materials and equipment stored on or off the Site shall be conditioned upon compliance by Contractor with procedures reasonably satisfactory to Owner to establish Owner's title to such materials and equipment or otherwise protect Owner's interest. Contractor solely shall be responsible for payment of all costs of applicable insurance, storage and transportation to the site for materials and equipment stored off the site.

9.3.3 Contractor warrants that, upon submittal of an Application for Payment, all Work for which payment previously has been received from Owner shall, to the best of Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of Contractor, Subcontractors, material suppliers or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work. **CONTRACTOR SHALL INDEMNIFY AND HOLD OWNER HARMLESS FROM ANY LIENS, CLAIMS, SECURITY INTEREST OR ENCUMBRANCES FILED BY CONTRACTOR, SUBCONTRACTORS OR ANYONE CLAIMING BY, THROUGH OR UNDER CONTRACTOR OR SUBCONTRACTOR(S) FOR ITEMS COVERED BY PAYMENTS MADE BY OWNER TO CONTRACTOR**.

9.3.4 By submission of an Application for Payment, Contractor certifies that there are no known liens or bond claims outstanding as of the date of said Application for Payment, that all due and payable bills with respect to the Work have been paid to date or are included in the amount requested in the current application and, except for such bills not paid but so included, there is no known basis for the filing of any liens or bond claims relating to the Work and that releases from all Subcontractors and Contractor's materialmen have been obtained in such form as to constitute an effective release of lien or claim under the laws of the State of Texas covering all Work theretofore performed and for which payment has been made by Owner to Contractor; provided if any of the foregoing is not true and cannot be certified, Contractor will revise the certificate as appropriate and identify all exceptions to the requested certifications.

9.4 PAY APPLICATION APPROVAL

9.4.1 Design Consultant shall, within two (2) business days after receipt of Contractor's Application for Payment, either approve the Application for Payment or reject the Application for Payment and state on the electronic notification to Contractor and Owner the Design Consultant's reasons for withholding approval, as provided in **Section 9.5.1** herein.

9.4.2 The certification of an Application for Payment will constitute a representation by Design Consultant to Owner, based on Design Consultant's evaluation of the Work and the data comprising the Application for Payment, that the Work has

progressed to the point indicated and that, to the best of Design Consultant's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to any specific qualifications expressed by Design Consultant. The issuance of a Certificate for Payment further will constitute a representation that Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that Design Consultant has:

(1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work;

(2) reviewed construction means, methods, techniques, sequences or procedures;

(3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by Owner to substantiate Contractor's right to payment; or

(4) made any examination to ascertain how or for what purpose Contractor has used money previously paid on account of the Contract Sum.

9.5 DECISIONS TO REJECT APPLICATION FOR PAYMENT

9.5.1 The Application for Payment may be rejected to protect Owner for any of the following reasons:

9.5.1.1 Work not performed or defective ;

9.5.1.2 third party claims filed or reasonable evidence indicating a probable filing of such claims for which Contractor is responsible hereunder unless security acceptable to Owner is provided by Contractor;

9.5.1.3 failure of Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

9.5.1.4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum and Contractor has failed to provide Owner adequate assurance of its continued performance within a reasonable time after demand;

9.5.1.5 damage to Owner or another contractor;

9.5.1.6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;

9.5.1.7 persistent failure by Contractor to carry out the Work in accordance with the Contract Documents;

9.5.1.8 the applicable liquidated damages were not included in the Application for Payment;

9.5.1.9 billing for unapproved/unverified materials stored off Site; or

9.5.1.10 a current schedule update has not been submitted by Contractor.

9.5.2 Owner shall not be deemed in default by reason of rejecting Application for Payment as provided for in **Section 9.5.1** herein.

9.6 PROGRESS PAYMENTS

9.6.1 After the final approval of the Application for Payment, Owner may make payment in the manner and within the time provided in the Contract Documents.

9.6.2 During the latter part of each month, as the Work progresses on all Owner Contracts regardless of Contract Sum, Owner and Contractor shall determine the cost of the labor and materials incorporated into the Work during that month and actual invoiced cost of Contractor-acquired materials stored on the Project Site, and/or within off-site storage facilities either owned or leased by Contractor. Upon receipt of a complete and mathematically accurate Application for Payment from Contractor, Owner shall make payments, in accordance with **Article IX** herein, to Contractor within thirty (30) calendar days on Contracts totaling four hundred thousand dollars ($400,000.00) or less, based upon such cost determination and at the Contract prices in a sum equivalent to ninety percent (90%) of each such invoice. The remaining ten percent (10%) retainage shall be held by Owner until the Final Completion. However, where the Contract amount exceeds four hundred thousand dollars ($400,000.00), installments shall be paid to Contractor at the rate of ninety-five percent (95%) of each monthly invoice within thirty (30) calendar days of Owner receipt of a complete and mathematically accurate Application for Payment from the Contractor, and the retainage held until Final Completion shall be five percent (5%).

9.6.3 Owner's payment of installments shall not, in any way, be deemed to be a final acceptance by Owner of any part of the Work, shall not prejudice Owner in the final settlement of the Contract account or shall not relieve Contractor from completion of the Work herein provided.

9.6.4 Contractor shall, within ten (10) calendar days following receipt of payment from Owner, pay all bills for labor and materials performed and furnished by others in connection with the construction, furnishing and equipping of the improvements

and the performance of the work, and shall, if requested, provide Owner with written evidence of such payment. Contractor's failure to make payments or provide written evidence of such payments within such time shall constitute a material breach of this contract, unless Contractor is able to demonstrate to Owner bona fide disputes associated with the unpaid Subcontractor(s) or supplier(s) and its/their work. Contractor shall include a provision in each of its subcontracts imposing the same written documentation of payment obligations on its Subcontractors as are applicable to Contractor hereunder, and if Owner so requests, shall provide copies of such Subcontractor payments to Owner. If Contractor has failed to make payment promptly to Contractor's Subcontractors or for materials or labor used in the Work for which Owner has made payment to the Contractor, Owner shall be entitled to withhold payment to Contractor to the extent necessary to protect Owner.

9.6.5 Owner and/or Design Consultant shall, if practicable and upon request, furnish to Subcontractor information regarding percentages of completion or amounts applied for by Contractor and action taken thereon by Owner and Design Consultant on account of portions of the Work done by such Subcontractor.

9.6.6 Neither Owner nor Design Consultant shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law, if any.

9.6.7 Payments to material suppliers shall be treated in a manner similar to that provided in **Section 9.6.2, Section 9.6.3** and **Section 9.6.4** herein regarding Subcontractors.

9.6.8 A Certificate for Payment, a progress payment or a partial or entire use or occupancy of the Project by Owner shall not constitute acceptance of Work that was not performed or furnished in accordance with the Contract Documents.

9.6.9 Contractor shall, as a condition precedent to any obligation of Owner under this Contract, provide to Owner payment and performance bonds in the full penal amount of the Contract in accordance with Texas Government Code Chapter 2253.

9.7 SUBSTANTIAL COMPLETION

9.7.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof sufficiently is complete in accordance with the Contract Documents so that Owner may occupy or utilize the Work for its intended use. In the event Substantial Completion is not achieved by the designated date, or as that date may be extended by Change Order(s), Owner may withhold payment of sums necessary to pay the estimated Liquidated Damages due Owner until Final Completion is achieved. Owner also shall be entitled, at any time, to deduct out of any sums due to Contractor any or all Liquidated Damages due Owner in accordance with the Contract between Owner and Contractor.

9.7.2 When Contractor considers that the Work, or a portion thereof which Owner agrees to accept separately, is Substantially Complete, Contractor shall prepare and submit to Owner and Design Consultant a preliminary comprehensive list of items to be completed or corrected prior to Final Completion and final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.7.3 Upon receipt of Contractor's list of items to be completed or corrected, Owner and Design Consultant will make a Site inspection to determine whether the Work or designated portion thereof is Substantially Complete. If Owner's or Design Consultant's inspection discloses any item, whether or not it was included on Contractor's list of items to be completed or corrected, which is not sufficiently complete or correct in accordance with the Contract Documents so that Owner may occupy or utilize the Work or designated portion thereof for its intended use, Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon written notification by Owner or Design Consultant. In such case, Contractor then shall submit a request for another inspection by Owner and Design Consultant to determine Substantial Completion and Contractor shall be responsible for all costs incurred and associated with re-inspection.

9.7.4 When the Work or designated portion thereof is Substantially Complete, Design Consultant or Owner shall prepare a Certificate of Substantial Completion (Vertical Projects) or a Letter of Conditional Approval (Horizontal Projects) which shall:

(1) establish the date of Substantial Completion (which will be the date on which the Work met the requirements under the Contract Documents for Substantial Completion);

(2) establish responsibilities of Owner and Contractor, as agreed to by Owner and Contractor, for security, maintenance, heat, utilities, damage to the Work and insurance; and

(3) fix the time limit by which Contractor shall complete all items on the list accompanying the Certificate.

Warranties required by the Contract Documents shall commence on the date of

Substantial Completion of the Work, or the designated portion thereof, unless otherwise provided in the Certificate of Substantial Completion.

9.8 PARTIAL OCCUPANCY OR USE

9.8.1 Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with Contractor, provided such occupancy or use is consented to by the insurer as required under **Section 11.4.1.5** herein and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is Substantially Complete, provided Owner and Contractor have accepted in writing the responsibilities assigned to each of them for security, maintenance, heat, utilities, damage to the Work and insurance and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When Contractor considers a portion of the Work to be Substantially Complete, Contractor shall prepare and submit a list of items to be completed or corrected prior to Final Completion and final payment and submit such list to Owner and Design Consultant, as provided under **Section 9.8.2** herein. Consent of Contractor to partial occupancy or use shall not be unreasonably withheld. The state of the progress of the Work shall be determined by written agreement between Owner and Contractor or, if no agreement is reached, by the decision of Design Consultant.

9.8.2 Immediately prior to such partial occupancy or use, Owner, Contractor and Design Consultant collectively shall inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

9.8.3 Unless expressly agreed upon in writing, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

9.8.4 Upon such partial occupancy or use, and upon Substantial Completion, Owner may assume responsibility for maintenance, security and insuring that portion of the Work that it has put into use.

9.8.5 Partial occupancy or use by Owner does not constitute substantial completion and does not start any warranty period(s).

9.9 FINAL COMPLETION AND FINAL PAYMENT

9.9.1 When all of the Work finally is completed and ready for final inspection, Contractor shall notify Owner and Design Consultant thereof in writing. Thereupon, Owner and Design Consultant will make final inspection of the Work and, if the Work is complete in full accordance with this Contract and this Contract has been fully performed, the final Application for Payment may be submitted. If Owner and Design Consultant are unable to approve the final Application for Payment for reasons for which Contractor is responsible and Owner and Design Consultant are required to repeat a final inspection of the Work, Contractor shall be responsible for all costs incurred and associated with such repeat final inspection(s) and said costs may be deducted by Owner from the Contractor's retainage.

9.9.2 Contractor shall not be entitled to payment of retainage unless and until it submits to Owner its affidavit that the payrolls, invoices for materials and equipment, and other liabilities, to include Liquidated Damages, connected with the Work for which Owner or the Owner's property might be responsible fully have been paid or otherwise satisfied or will be paid from final payment; releases and waivers of liens from all Subcontractors of Contractor and of any and all other parties required by Design Consultant or Owner that either are unconditional or conditional on receipt of final payment; Certificates of insurance showing continuation of required insurance coverage; such other documents as Owner may request; and consent of Surety to final payment. A Retainage Checklist shall be provided by Owner to Contractor upon request.

9.9.3 If, after Substantial Completion of the Work, Final Completion thereof materially is delayed through no fault of Contractor or by Issuance of Change Orders affecting Final Completion, and Design Consultant so confirms, Owner shall, upon application by Contractor and certification by Design Consultant and without terminating the Contract, make payment of the balance due for that portion of the work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of Surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Design Consultant prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

9.9.4 Request for final payment by Contractor shall constitute a waiver of all claims against Owner except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

9.10 ADDITIONAL INSPECTIONS. In addition to any Liquidated Damages payable to Owner by Contractor, Owner shall be entitled to deduct from the Contract Sum amounts paid to Design Consultant for any additional inspections or services, provided that Design Consultant undertook these services due to the fault or neglect of Contractor if:

(1) Design Consultant is required to make more than one inspection for Substantial Completion;

(2) Design Consultant is required to make more than one inspection for final Completion; or

(3) the Work is not substantially complete within thirty (30) calendar days after the date established for Substantial Completion in the Contract Documents.

ARTICLE X. PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. Contractor shall develop a safety program applicable to each job site and to the Work to be done, review such program with Owner in advance of beginning the Work, and enforce such program at all times. Further, Contractor shall comply with all applicable laws and regulations including, but not limited to, the standards and regulations promulgated by the Secretary of Labor under the Occupational Safety and Health Act of 1970 (OSHA) and any other legislation enacted for the safety and health of Contractor employees. Owner shall have the right, but not the obligation, to inspect and verify Contractor's compliance with Contractor's responsibility for protecting the safety and health of its employees and Subcontractor.

10.1.2 Contractor shall notify Owner immediately, by telephone with prompt confirmation in writing, of all injuries and fatalities including, but not limited to, copies of all reports and other documents filed or provided to Contractor's insurers and the State of Texas in connection with such injuries or fatalities.

10.1.3 Contractor has adopted or shall adopt its own policy to assure a drug and alcohol free work place while performing the Work. Contractor's employees, agents, and Subcontractors shall not perform any service for Owner while under the influence of alcohol or any controlled substance. Contractor, its employees, agents and Subcontractors shall not use, possess, distribute or sell illegal, illicit and/or prescribed controlled drugs or drug paraphernalia or misuse legitimate prescription drugs while on Site or performing the Work. Contractor, its employees, agents and Subcontractors shall not use, possess, distribute or sell alcoholic beverages while performing the Work or while on Site or performing the Work. Contractor will remove any of its employees or Subcontractor employees from performing the Work or from the Site any time there is suspicion of alcohol and/or drug use, possession or impairment involving such employee and at any time an incident occurs where drug or alcohol use could have been a contributing factor. Owner has the right to require Contractor to remove employees or Subcontractor employees from performing the Work or from the

Site any time cause exists to suspect alcohol or drug use. In such cases, Contractor's or Subcontractor's employees only may be considered for return to work after Contractor certifies, as a result of a for-cause test conducted immediately following a removal, said employee was in compliance with this Contract. Contractor will not employ any individual, or will not accept any Subcontractor employees, to perform the Work who either refuses to take or tests positive in any alcohol or drug test.

10.1.4 Contractor shall comply with all applicable federal, state and local drug and alcohol related laws and regulations (e.g., Department of Transportation regulations, Department of Defense Drug-free Work-free Workforce Policy, Drug-Free Workplace Act of 1988). The presence of any firearms or other lethal weapons by any person is prohibited on the Project site, regardless of whether the owner thereof has a permit for a concealed weapon.

10.1.5 Both Owner and Contractor agree that these safety and health terms are of the highest importance and that a breach or violation of any of the terms of this **Section X** by Contractor or a Subcontractor will be a material and substantial breach of this Contract. In the event that Owner shall determine that Contractor has breached or violated the terms of this Section, then Owner shall determine, immediately upon written notice to Contractor, whether the Work shall be suspended as a result thereof. If the Work is suspended, the Work shall not recommence until Owner is satisfied that the safety provisions hereof shall not be breached or violated thereafter. If Owner terminates the Contract as a result of such breach or violation, Owner and Contractor shall complete their obligations hereunder to one another in accordance with **Section 14.2** herein.

10.1.6 Nothing contained in this **Article X** shall be interpreted as creating or altering the legal duty of Owner to Contractor or to Contractor's agents, employees, Subcontractors or third parties, or altering the status of Contractor as an independent contractor.

10.1.7 Notwithstanding either of the above provisions, or whether Owner exercises its rights set forth herein, Owner neither warrants nor represents to Contractor, Contractor's employees or agents, any Subcontractors or any other third party that Contractor's safety policy meets the requirements of any applicable law, code, rule or regulation, nor does Owner warrant that the proper enforcement of Contractor's policy will insure that no accidents or injuries will occur. In addition, any action by Owner under these provisions in no way diminishes any of Contractor's obligations under applicable law or the contract documents.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 Contractor shall take reasonable precautions for the safety of and shall provide reasonable protection to prevent damage, injury or loss to:

10.2.1.1 employees performing the Work and other persons who may be affected thereby;

10.2.1.2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of Contractor or Contractor's Subcontractors or Sub-Subcontractors; and

10.2.1.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of Construction.

10.2.2 Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

10.2.3 Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying all owners and users of adjacent sites and utilities.

10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for the execution of the Work, Contractor shall exercise extraordinary care and shall carry on such activities under the direct supervision of properly qualified personnel. Prior to the use of any explosives, Contractor shall submit a written blasting plan, shall obtain Owner's approval and shall comply with Owner's requirements for such use.

10.2.5 Contractor promptly shall remedy any and all damage and loss (other than damage or loss insured under property insurance required by the Contract Documents). Contractor shall also HOLD HARMLESS and UNCONDITIONALLY INDEMNIFY, PROTECT and DEFEND Owner, its elected officials, employees, officers, directors, volunteers and representatives of Owner, individually or collectively, from and against any and all damage or loss to property (other than the Work itself and including property of Contractor and of Owner) referred to in **Section 10.2.1.2** and **Section 10.2.1.3** herein, but only to the extent caused in whole or in part by the acts or omissions of Contractor, its agents, servants, and employees, or its Subcontractor(s) and its/their agents, servants, and employees, or anyone directly or indirectly employed by Contractor or Subcontractor, or by any other person or entity for which Contractor or Subcontractor may be responsible under the Contract Documents in connection with the Work to be performed, services to be rendered or materials to be furnished under this Contract, including, but not limited to, violations of any statute, regulation, ordinance or provision of this Contract. Notwithstanding anything to the contrary included herein, in no event shall Contractor be liable for claims arising out of accidents resulting from the sole negligence of Owner, all without, however, waiving any governmental immunity available to Owner under Texas Law and without waiving any defenses of the parties under Texas Law.

The foregoing obligations of Contractor are in addition to Contractor's obligations under **Section 3.18** herein**.**

10.2.6 Contractor shall designate a responsible member of Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated by Contractor in writing to Owner and Design Consultant.

10.2.7 Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

10.2.8 Notwithstanding the delivery of a survey or other documents by Owner, Contractor shall use reasonable efforts to perform all Work in such a manner so as to avoid damaging any utility lines, cables, pipes or pipelines on the property. Contractor acknowledges and accepts that the location of underground utilities (both public and private) reflected on any City-provided plans are not guaranteed and may not be completely accurate. Contractor shall locate and verify any and all utilities and associated service lines prior to beginning any Work. Contractor shall be responsible for and shall repair, at Contractor's own expense, any damage done to lines, cables, pipes and pipelines identified or not identified to Contractor.

10.3 EMERGENCIES.

10.3.1 In an emergency affecting safety of persons or property, Contractor shall exercise its best efforts to act to prevent or minimize threatened damage, injury or loss. Additional compensation or extension of time claimed by Contractor on account of an emergency shall be determined, as provided in **Section 4.3** and **Article VII** herein.

10.3.2 If Contractor causes damage resulting in an issue of safety and/or security to a property owner, Contractor immediately shall repair any damage caused. If Contractor does not or will not act immediately to repair the damage caused by Contractor to eliminate the resulting safety and/or security issue(s), Owner shall act to repair the damage caused and deduct all costs associated with the repair from any money due Contractor.

10.4 PUBLIC CONVENIENCE AND SAFETY

10.4.1 Contractor shall place materials stored at the Project site and shall conduct the Work at all times in a manner that causes no greater obstruction to the public than is considered necessary by Owner. Sidewalks or streets shall not be obstructed, except by special permission of Owner. Materials excavated and construction materials or plants used in the performance of the Work shall be placed in a manner that does not endanger the Work or prevent free access to all fire hydrants, water mains and appurtenances, water valves, gas valves, manholes for the telephone, telegraph signal or electric conduits, wastewater mains and appurtenances and fire alarm or police call boxes in the vicinity.

10.4.2 Owner reserves the right to remedy any neglect on the part of Contractor, in regard to public convenience and safety, which may come to Owner's attention after twenty-four (24) hours notice in writing to Contractor. In case of an emergency, Owner shall have the right immediately to remedy any neglect without notice. In either case, the cost of any work done by or for Owner to remedy Contractor's neglect shall be deducted by Owner from Contractor's Contract Sum. Contractor shall notify Owner, Owner's Traffic Control Department and Design Consultant when any street is to be closed or obstructed. The notice shall, in the case of major thoroughfares or street upon which transit lines operate, be given at least forty-eight (48) hours in advance. Owner reserves the right to postpone and/or prohibit any closure or obstruction of any streets or thoroughfares, to the extent necessary for the safety and benefit of the traveling public. Contractor shall, when directed by Owner or Design Consultant, keep any street or streets in condition for unobstructed use by Owner departments. When Contractor is required to construct temporary bridges or make other arrangements for crossing over ditches or around structures, Contractor's responsibility for accidents shall include the roadway approaches as well as the crossing structures.

10.4.3 Contractor shall limit airborne dust and debris throughout the Project site and its duration. Contractor shall apply the necessary amounts of water or other appropriate substance required to maintain sufficient moisture content for dust control. For City horizontal projects, Contractor shall apply appropriate amounts of water or other appropriate substance to the base on streets under construction and on detours required to maintain sufficient moisture control in the surface layer for dust control.

10.5 BARRICADES, LIGHTS AND WATCHMEN. If the Work is carried on, in or adjacent to any street, alley or public place, Contractor shall, at Contractor's own cost and expense, furnish, erect and maintain sufficient barricades, fences, lights and danger signals, provide sufficient watchmen and take such other precautionary measures as are necessary for the protection of persons or property and of the Work. All barricades shall be painted in a color that will be visible at night, and shall be illuminated by lights as required under City's Barricades specifications. The term "lights," as used in this **Section 10.5**, shall mean flares, flashers or other illuminated devices. A sufficient number of barricades with adequate markings and directional devices also shall be erected to keep vehicles from being driven on or into any Work under construction. Contractor will be held responsible for all damage to the Work due to failure of barricades, signs, lights and/or watchmen necessary to protect the Work. Whenever evidence is found of such damage, Owner or Design Consultant may order the damaged portion immediately removed and replaced by Contractor at Contractor's sole cost and expense. Contractor's responsibility for maintenance of barricades, signs, lights, and for providing watchmen, as required under this **Section 10.5**, shall not cease until the Project has been finally accepted by Owner.

10.6 PUBLIC UTILITIES AND OTHER PROPERTIES TO BE CHANGED. In case it is necessary for Contractor to change or move the property of Owner or of any telecommunications or public utility, such property shall not be touched, removed or interfered with until ordered

to do so by Owner. Owner reserves the right to grant any public or private utility personnel the authority to enter upon the Project site for the purpose of making such changes or repairs to their property that may become necessary during the performance of the Work. Owner reserves the right of entry upon the Project site at any time and for any purpose, including repairing or relaying sewer and water lines and appurtenances, repairing structures and for making other repairs, changes, or extensions to any of Owner's property. Owner's actions shall conform to Contractor's current and approved schedule for the performance of the Work, provided that proper notification of schedule requirements has been given to Owner by Contractor.

10.7 TEMPORARY STORM SEWER AND DRAIN CONNECTIONS. When existing storm sewers or drains have to be taken up or removed, Contractor shall, at its expense, provide and maintain temporary outlets and connections for all public and private storm sewers and drains. Contractor also shall provide for all storm sewage and drainage which will be received from these storm drains and sewers. For this purpose, Contractor shall provide and maintain, at Contractor's own expense, adequate pumping facilities and temporary outlets or diversions. Contractor shall, at Contractor's own expense, construct such troughs, pipes or other structures that may be necessary and shall be prepared at all times to dispose of storm drainage and sewage received from these temporary connections until such time as the permanent connections are built and are in service. The existing storm sewers and connections shall be kept in service and maintained under the Contract, except where specified or ordered to be abandoned by Design Consultant. All storm water and sewage shall be disposed of in a satisfactory and lawful manner so that no nuisance is created and that the Work under construction will be adequately protected.

10.8 ARRANGEMENT AND CHARGE FOR WATER FURNISHED BY THE OWNER/ELECTRICITY FOR THE PROJECT/WIRELESS ACCESS

10.8.1 When Contractor desires to use Owner's water in connection with the Work, Contractor shall make complete and satisfactory arrangements with the San Antonio Water Service and shall be responsible for the cost of the water Contractor uses. Where meters are required and used, the charge will be at the regular established rate; where no meters are required and used, the charge will be as prescribed by Owner ordinance, or where no ordinance applies, payment shall be based on estimates made by the representatives of the San Antonio Water Service.

10.8.2 Contractor shall make complete and satisfactory arrangements for electricity and metered electrical connections with Owner or with any retail electric provider, in the event that separately metered electrical connections are required for the Project. Contractor shall pay for all electricity used in the performance of the Work through separate metered electrical connections obtained by Contractor through a retail electric provider.

10.8.3 If Contractor elects or is required by City to place and operate out of a construction trailer or office on the Project site, for which all related costs shall be borne by Contractor, Contractor shall provide for an electronic device to exchange

data wirelessly via a local area computer network, to include high-speed internet connections (commonly known as "Wi Fi access"), for City personnel's use while on the Project site for the duration of the Project.

10.9 USE OF FIRE HYDRANTS. Contractor, Subcontractors and any other person working on the Project shall not open, turn off, interfere with, attach any pipe or hose to or connect anything with any fire hydrant, stop valve or stop cock, or tap any water main belonging to Owner, unless duly authorized in writing to do so by Owner.

10.10 ENVIRONMENTAL COMPLIANCE

10.10.1 Contractor and its Subcontractors are deemed to have made themselves familiar with and at all times shall comply with any and all applicable federal, state or local laws, rules, regulations, ordinances and rules of common law now in effect (including any amendments now in effect), relating to the environment, Hazardous Substances or exposure to Hazardous Substances including, but not limited to, the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C.A. §§ 9601, et seq.; the Hazardous Materials Transportation Act, 49 U.S.C.A. §§ 1801, et seq.; the Resource Conservation and Recovery Act of 1976, 42 U.S.C.A. §§ 6901, et seq.; the Federal Water Pollution Control Act, 33 U.S.C.A §§ 1201, et seq.; the Toxic Substances Control Act, 15 U.S.C.A. §§ 2601, et seq.; the Clean Air Act, 42 U.S.C.A. §§ 7401, et seq.; the Safe Drinking Water Act, 42 U.S.C.A. §§ 3808, et seq., and any current judicial or administrative interpretation of these laws, rules, regulations, ordinances or rules of common law including, but not limited to, any judicial or administrative order, consent decree or judgment affecting the Project.

10.10.2 In the event Contractor encounters on the Project Site materials reasonably believed to be a Hazardous Substance that have not been rendered harmless, and the removal of such materials is not a part of the scope of Work required under the Contract Documents, Contractor immediately shall stop Work in the affected area and report in writing the facts of such encounter to Owner and Design Consultant. Work in the affected area shall not thereafter be resumed except by written order of Owner and written consent of Contractor, unless and until the material is determined not to be a Hazardous Substance or the Hazardous Substance is remediated. Unless removal of such materials is a part of the scope of Work required under the Contract Documents, Owner shall remediate the Hazardous Substance with a separate contractor or through a Change Order with Contractor. If the Hazardous Substance exists in the affected area due to the fault or negligence of Contractor or any of its Subcontractors, Contractor shall be responsible for remediating the condition at the sole expense of Contractor. If applicable, such remediation shall be in accordance with Contractor's Spill Remediation Plan. An extension of the Contract Time for any delay in the progress schedule caused as a result of the discovery and remediation of a Hazardous Substance may be granted by Owner only if the Project critical path is affected and Contractor is not the source of the Hazardous Substance. Any request for an extension of the Contract Time related to the discovery and remediation of a Hazardous Substance is subject to the provisions of **Section 4.3** and **Article VIII** herein.

10.10.3 Contractor shall be responsible for identification, abatement, cleanup, control, removal, remediation and disposal of any Hazardous Substance brought into or onto the site by Contractor or any Subcontractor or Contractor's Supplier. Contractor shall obtain any and all permits necessary for the legal and proper handling, transportation and disposal of the Hazardous Substance and shall, prior to undertaking any abatement, cleanup, control, removal, remediation and/or disposal, notify Owner and Design Consultant so that they may observe the activities; provided, however, that it shall be Contractor's sole responsibility to comply with all applicable laws, rules, regulations or ordinances governing said activities.

ARTICLE XI. INSURANCE AND BONDS

11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 Without limiting any of the other obligations or liabilities of Contractor under the Contract Documents, Contractor shall purchase and maintain, during the term of the Contract and at Contractor's own expense, the minimum liability insurance coverage described below with insurance companies duly authorized or approved to do business in the State of Texas and otherwise satisfactory to Owner. Contractor also shall require each Subcontractor performing work under the Contract, at Subcontractor's own expense, to maintain levels of insurance necessary and appropriate for the Work performed during the term of the Contract, said levels of insurance comply with all applicable laws. Subcontractor's liability insurance shall name Contractor and Owner as additional insureds by using endorsement CG 20 26 or broader. Certificates of insurance complying with the requirements prescribed in **Section 11.1.2** herein shall show the existence of each policy, together with copies of all policy endorsements showing Owner as an additional insured, and shall be delivered to Owner before any Work is started. Contractor promptly shall furnish, upon the request of and without expense to Owner, a copy of each policy required, including all endorsements, which shall indicate:

11.1.1.1 Workers' Compensation, with statutory limits, with the policy endorsed to provide a waiver of subrogation as to Owner; Employer's Liability Insurance of not less than $500,000 for each accident, $500,000 disease for each employee and $500,000 disease policy limit;

11.1.1.2 Commercial General Liability Insurance, Personal Injury Liability, Independent Contractor's Liability and Products and Completed Operations and Contractual Liability covering, but not limited to, the liability assumed under the indemnification provisions of this Contract, fully insuring Contractor's (and/or Subcontractor's) liability for injury to or death of Owner's employees and all third parties, and for damage to property of third parties, with a combined bodily injury (including death) and property damage minimum limit of $1,000,000 per occurrence, $2,000,000 annual aggregate. If coverage is written on a

claims-made basis, coverage shall be continuous (by renewal or extended reporting period) for no less than sixty (60) months following completion of the contract and acceptance of work by Owner. Coverage, including any renewals, shall have the same retroactive date as the original policy applicable to the Project. Owner shall be named as additional insured by using endorsement CG 20 26 or broader. The general liability policy shall include coverage extended to apply to completed operations and XCU hazards. The Completed Operations coverage must be maintained for a minimum of one (1) year after final completion and acceptance of the Work, with evidence of same filed with Owner. The policy shall include an endorsement CG2503 amendment of limits (designated project or premises) in order to extend the policy's limits specifically to the Project in question.

11.1.1.3 Business Automobile Liability Insurance, covering owned, hired and non- owned vehicles, with a combined bodily injury (including death) and property damage minimum limit of $1,000,000 per occurrence. Such insurance shall include coverage for loading and unloading hazards.

11.1.1.4 Five (5) calendar days prior to a suspension, cancellation or non-renewal of any required line of insurance coverage, Contractor shall provide Owner a replacement certificate of insurance with all applicable endorsements included. Owner shall have the option to suspend Contractor.

11.1.2 If any insurance company providing insurance coverage(s) required under the Contract Documents for Contractor becomes insolvent or becomes the subject of any rehabilitation, conservatorship, liquidation or similar proceeding, Contractor immediately shall procure, upon first notice to Contractor or Owner of such occurrence and without cost to Owner, replacement insurance coverage before continuing the performance of the Work at the Project. Any failure to provide such replacement insurance coverage shall constitute a material breach of the Contract.

11.2 PROPERTY INSURANCE

11.2.1 In addition to the insurance described in **Section 11.1** and **Section 11.4** herein, Contractor shall obtain at its expense and maintain throughout the duration of the Project, All-Risk Builder's Risk Insurance, if the Project involves complete construction of a new building, or an All-Risk Installation Floater policy, if the Project involves materials and supplies needed for additions to, renovations or remodeling of an existing building. Coverage on either policy shall be All-Risk, including, but not limited to, Fire, Extended Coverage, Vandalism and Malicious Mischief, Flood (if located in a flood zone) and Theft, in an amount equal to one hundred percent (100%) of the insurable value of the Project for the Installation Floater policy, and one hundred percent (100%) of the replacement cost of the Project for the Builder's Risk policy. If an Installation Floater policy is provided, Owner shall be shown as a Joint Named Insured with respect to the Project. If a

Builder's Risk policy is provided, the policy shall be written on a Completed Value Form, including materials delivered and labor performed for the Project. This policy shall be in the name of Contractor and naming Owner and Subcontractors, as well as any Sub-Subcontractors, as additional insureds as their interests may appear. The policy shall have endorsements as follows:

11.2.1.1 This insurance shall be specific as to coverage and not contributing insurance with any permanent insurance maintained on the property.

11.2.1.2 Loss, if any, shall be adjusted with and made payable to Contractor or Owner and Contractor as trustee for the insureds as their interests may appear.

11.2.2 **BOILER AND MACHINERY INSURANCE**. If applicable, Owner shall purchase and maintain Boiler and Machinery Insurance required by the Contract Documents or by law, which specifically shall cover such insured objects during installation and until final acceptance by Owner. This insurance shall include the interests of Owner, Contractor, Subcontractors and Sub-Subcontractors in the Work, and Owner and Contractor shall be named insureds.

11.2.3 **LOSS OF USE INSURANCE**. Owner, at Owner's option, may purchase and maintain such insurance as will insure Owner against loss of use of Owner's property due to fire or other hazards, however caused. Owner waives all rights of action against Contractor that it may now have or have in the future for loss or damage to Owner's property howsoever arising, including consequential losses due to fire or other hazards however caused.

11.2.4 Contractor shall provide to Design Consultant for delivery to Owner a Certificate of Insurance evidencing all property insurance policies procured under **Section 11.2** herein and all endorsements thereto, before any exposure to loss may occur.

11.2.5 Partial occupancy or use in accordance with **Section 9.9** herein shall not commence until the insurance company/companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. Owner and Contractor shall take reasonable steps to obtain consent of the insurance company/companies and shall take no action without mutual written consent with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

11.3 PERFORMANCE BOND AND PAYMENT BONDS

11.3.1 Subject to the provisions of **Section 11.3.2** herein, Contractor shall, with the execution and delivery of the Contract, furnish and file with Owner, in the amounts required in this **Article XI**, the surety bonds described in **Section 11.3.1.1** and **Section 11.3.1.2** herein, with said surety bonds in accordance with the provisions of Chapter 2253, Texas Government Code, as amended. Each surety bond shall be signed by Contractor, as the Principal, as well as by an established corporate surety bonding company as surety, meeting the

requirements of **Section 11.3.3** herein and approved by Owner. The surety bonds shall be accompanied by an appropriate Power-of-Attorney clearly establishing the extent and limitations of the authority of each signer to so sign and shall include:

11.3.1.1 **PERFORMANCE BOND**. A good and sufficient bond in an amount equal to one hundred percent (100%) of the total Contract Sum, guaranteeing the full and faithful execution of the Work and performance of the Contract in accordance with Plans, Specifications and all other Contract Documents, including any extensions thereof, for the protection of Owner. This bond shall also provide for the repair and maintenance of all defects due to faulty materials and workmanship that appear within a period of one (1) year from the date of final Completion or acceptance of the Work by the Owner or lesser or longer periods as may be otherwise designated in the Contract Documents.

11.3.1.2 **PAYMENT BOND**. A good and sufficient bond in an amount equal to 100% of the total Contract Sum, guaranteeing the full and prompt payment of all claimants supplying labor or materials in the prosecution of the Work provided for in the Contract, and for the use and protection of each claimant.

11.3.2 If the Contract Sum, including Owner-accepted Alternates and allowances, if any, is greater than $100,000, Performance and Payment Bonds equaling one hundred percent (100%) of the Contract Sum are mandatory and shall be provided by Contractor. If the Contract Sum is greater than $25,000 but less than or equal to $100,000, only a Payment Bond equaling One hundred percent (100%) of the Contract amount is mandatory; provided, however, that Contractor also may elect to furnish a Performance Bond in the same amount if Contractor so chooses. If the Contract Sum is less than or equal to $25,000, Contractor may elect not to provide Performance and Payment Bonds; provided that in such event, no money will be paid by Owner to Contractor until Final Completion of all Work. If Contractor elects to provide Performance and Payment Bonds, the Contract Sum shall be payable to Contractor through progress payments in accordance with these General Conditions.

11.3.3 No surety will be accepted by Owner that is in default, delinquent on any bonds or that is a party to any litigation against Owner. All bonds shall be made and executed on Owner's standard forms, shall be approved by Owner and shall be executed by not less than one (1) corporate surety that is authorized and admitted to do business in the State of Texas, is licensed by the State of Texas to issue surety bonds, is listed in the most current United States Department of the Treasury List of Acceptable Sureties and is otherwise acceptable to Owner. Each bond shall be executed by Contractor and the surety and shall specify that legal venue for enforcement of each bond exclusively shall lie in Bexar County, Texas. Each surety shall designate an agent resident in Bexar County, Texas to which any requisite statutory notices may be delivered and on which service of process may be had in matters arising out of the suretyship.

11.3.4 The person or persons, partnership, company, firm, limited liability company, association, corporation or other business entity to whom the Contract is awarded shall, within ten (10) days after such award, sign the required Contract with Owner and provide the necessary surety bonds and evidence of insurance as required under the Contract Documents. No Contract shall be binding on Owner until:

(1) it has been approved as to form by Owner's City Attorney;

(2) it has been executed by Owner's City Manager;

(3) the performance and payment bonds and evidence of insurance have been furnished to Owner by Contractor, as required by the Contract Documents; and

(4) a fully executed Contract has been delivered to Contractor.

11.3.5 The failure of Contractor to execute the Contract and deliver the required bonds and evidence of insurance within ten (10) days after the Contract is awarded or as soon thereafter as Owner can assemble and deliver the Contract and by the time the Owner-scheduled Pre-Construction meeting is held shall, at Owner's option, constitute a material breach of Contractor's bid proposal and Owner may rescind the Contract award and collect or retain the proceeds of the bid security. By reason of the uncertainty of the market prices for materials and labor, and it being impracticable and difficult to determine accurately the amount of damages occurring to Owner by reason of Contractor's failure to execute the Contract within ten (10) days and deliver bonds and insurance by the Owner-scheduled Pre-Construction meeting, the filing of a bid proposal shall constitute an acceptance of this **Section 11.3.5**. In the event Owner should re-advertise for bids, the defaulting Contractor shall not be eligible to bid, and the lowest responsible bid obtained in the re-advertisement shall be the bid referred to in this **Section 11.3**.

11.4 'UMBRELLA' LIABILITY INSURANCE. Contractor shall obtain, pay for and maintain Umbrella Liability Insurance during the Contract term, insuring Contractor for an amount of not less than $5,000,000 per occurrence combined limit Bodily Injury (including death) and Property Damage, that follows form and applies in excess of the primary coverage required hereinabove. Owner and Design Consultant shall be named as additional insureds using endorsement CG 20 26 or broader. No aggregate shall be permitted for this type of coverage. The Umbrella Liability Insurance policy shall provide "drop down" coverage, where the underlying primary insurance coverage limits are insufficient or exhausted.

11.5 POLICY ENDORSEMENTS AND SPECIAL CONDITIONS

11.5.1 Each insurance policy to be furnished by Contractor shall address the following required provisions within the certificate of insurance, which shall be reflected in the body of the insurance contract and/or by endorsement to the policy:

11.5.1.1 Owner and Design Consultant shall be named as additional insureds on all liability coverages, using endorsement CG 20 26 or broader. When Owner employs a Construction Manager on the Project, Contractor and Subcontractor(s) shall include the Construction Manager on all liability insurance policies to the same extent as Owner and Design Consultant are required to be named as additional insureds.

11.5.1.2 Within five (5) calendar days of a suspension, cancellation or non-renewal of any required line of insurance coverage, Contractor shall provide Owner a replacement certificate of insurance with all applicable endorsements included. Owner shall have the option to suspend Contractor's performance should there be a lapse in coverage at any time during the Contract.

11.5.1.3 The terms "Owner," "City" or "City of San Antonio" shall include all authorities, boards, bureaus, commissions, divisions, departments and offices of Owner and the individual members, employees and agents thereof in their official capacities, while acting on behalf of Owner.

11.5.1.4 The policy phrase or clause "Other Insurance" shall not apply to Owner where Owner is an additional insured on the policy. The required insurance coverage furnished by Contractor shall be the primary insurance for all purposes for the Project, as well as the primary insurance for the additional insureds named in the required policies.

11.5.1.5 All provisions of the Contract Documents concerning liability, duty and standard of care, together with the indemnification provision, shall, to the maximum extent allowable in the insurance market, be underwritten with contractual liability coverage(s) sufficient to include such obligations with the applicable liability policies.

11.5.2 Concerning the insurance to be furnished by the Contractor, it is a condition precedent to acceptability which:

11.5.2.1 All policies must comply with the applicable requirements and special provisions of this **Article 11**.

11.5.2.2 Any policy evidenced by a Certificate of Insurance shall not be subject to limitations, conditions or restrictions deemed inconsistent with the intent of the insurance requirements set forth herein, and Owner's decision regarding whether any policy contains such provisions and contrary to this requirement shall be final.

11.5.2.3 All policies required are to be written through companies duly authorized and approved to transact that class of insurance in the State of Texas and that otherwise are acceptable to Owner.

11.5.3 Contractor agrees to the following special provisions:

11.5.3.1 Contractor hereby waives subrogation rights for loss or damage to the extent same are covered by insurance. Insurers shall have no right of recovery or subrogation against Owner, it being the intention that the insurance policies shall protect all parties to the Contract and be primary coverage for all losses covered by the policies. This waiver of subrogation shall be included, by endorsement or otherwise, as a provision of all policies required under this **Article XI**.

11.5.3.2 Insurance companies issuing the insurance policies and Contractor shall have no recourse whatsoever against Owner for payment of any premiums or assessments for any deductibles, as all such premiums and assessments solely are the responsibility and risk of Contractor.

11.5.3.3 Approval, disapproval or failure to act by Owner, regarding any insurance supplied by Contractor or any SUBCONTRACTOR(s), shall not relieve Contractor of any responsibility or liability for damage or accidents as set forth in the Contract Documents. The bankruptcy, insolvency or denial of liability of or by Contractor's insurance company shall likewise not exonerate or relieve Contractor from liability.

11.5.3.4 Owner reserves the right to review the insurance requirements of this **Article XI** during the effective period of this Contract and to adjust insurance coverage and insurance limits when deemed necessary and prudent by Owner's Risk Management Division, based upon changes in statutory law, court decisions or the claims history of Contractor and Subcontractors. Contractor agrees to make any reasonable request for deletion, revision or modification of particular policy terms, conditions, limitations or exclusions, except where policy provisions are established by law or regulation binding upon either party to this Contract or upon the underwriter of any such policy provisions. Upon request by Owner, Contractor shall exercise reasonable efforts to accomplish such changes in policy coverage.

11.5.3.5 No special payments shall be made for any insurance policies that Contractor and Subcontractors are required to carry. Except as provided in **Section 11.5.3.4** herein, all amounts payable regarding the insurance policies required under the Contract Documents are included in the Contract Sum.

11.5.3.6 Any insurance policies required under this **Article XI** may be written in combination with any of the other policies, where legally permitted, but none of the specified limits neither may be lowered or otherwise negatively impacted by doing so, nor may any of the requirements or special provisions of this **Article XI** be limited or circumvented by doing so.

ARTICLE XII. INSPECTING, UNCOVERING AND CORRECTING OF WORK

12.1 Inspecting Work. Owner and Design Consultant will have authority to reject Work that does not conform to the Contract Documents. Whenever Owner or Design Consultant considers it necessary or advisable, Owner and/or Design Consultant will have authority to require inspection or testing of the Work in accordance with this **Article XII**, whether or not such Work is fabricated, installed or completed.

12.2 UNCOVERING WORK

12.2.1 If a portion of the Work is covered, concealed and/or obstructed, contrary to Owner's or Design Consultant's requirements specifically expressed in the Contract Documents, it must be uncovered for Owner's or Design Consultant's inspection and properly be replaced at Contractor's expense without any change in the Contract Time or Sum.

12.2.2 If a portion of the Work has been covered, concealed and/or obstructed and Design Consultant or Owner has not inspected the Work prior to its being covered, concealed and/or obstructed, Owner and Design Consultant retain the right to inspect such Work and, when directed by Owner, Contractor shall uncover it. If said Work is found to be in accordance with the Contract Documents, the costs for uncovering and replacement shall, by appropriate Change Order, be paid by Owner. If such Work uncovered is found to not be in accordance with the Contract Documents, Contractor shall pay all costs associated with the uncovering, correction and replacement of the Work, unless the condition found was caused by Owner or Owner's separate contractor, in which event Owner shall be responsible for payment of actual costs incurred by Contractor.

12.3 CORRECTING WORK

12.3.1 Contractor promptly shall correct any Work rejected by Owner or Design Consultant as failing to conform to the requirements of the Contract Documents, whether inspected before or after Substantial Completion and whether or not fabricated, installed or completed. Contractor shall bear costs of correcting such rejected Work, along with all costs for additional testing, inspections and compensation for Design Consultant's services and expenses made necessary thereby.

12.3.2 In addition to Contractor's warranty obligations, if any of the Work is found to be defective or nonconforming with the requirements of the Contract Documents, including, but not limited to these General Conditions, Contractor shall correct it promptly after receipt of written notice from Owner or Design Consultant to correct unless Owner previously has given Contractor a written acceptance or waiver of the defect or nonconformity. Contractor's obligation to correct defective or nonconforming Work remains in effect for:

12.3.2.1 one (1) year after the date of Substantial Completion of the Work or

designated portion of the Work;

12.3.2.2 one (1) year after the date for commencement of warranties established by agreement in connection with partial occupancy under **Section 9.9.1** hereto; or

12.3.2.3 the stipulated duration of any applicable special warranty required by the Contract Documents.

12.3.3 The one (1) year period, described in **Section 12.3.2.1**, **Section 12.3.2.2** and **Section 12.3.2.3** herein, shall be extended, with respect to portions of the Work first performed after Substantial Completion, by the period of time between Substantial Completion and the actual completion of the Work.

12.3.4 The obligations of Contractor under **Section 3.5** herein and this **Section 12.3** shall survive final acceptance of the Work and termination of this Contract. Owner shall give notice to Contractor promptly after discovery of a defective or nonconforming condition in the Work. The one (1) year period stated in this **Section 12.3** does not limit the ability of Owner to require Contractor to correct latent defects or nonconformities in the Work, which defects or nonconformities could not have been discovered through reasonable diligence by Owner or Design Consultant at the time the Work was performed or at the time of inspection for certification of Substantial Completion or Final Completion. The one (1) year period also does not relieve Contractor from liability for any defects or deficiencies in the Work that may be discovered after the expiration of the one (1) year correction period.

12.3.5 Contractor shall remove from the Project Site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by Contractor nor accepted by Owner.

12.3.6 If Contractor fails to correct any defective or nonconforming Work within what Owner deems a reasonable time after Owner or Design Consultant gives written notice of rejection to Contractor, Owner may correct the defective or nonconforming Work in accordance with this **Section 12.3**. If Contractor promptly does not proceed with correction of any defective or nonconforming Work within a reasonable time fixed by written notice from Owner or Design Consultant, Owner may remove or replace the defective or nonconforming Work and store the salvageable materials or equipment at Contractor's expense. If Contractor does not pay the costs of removal and storage within ten (10) calendar days after written notice by Owner or Design Consultant, Owner may, upon ten (10) additional calendar days written notice, sell the materials and equipment at auction or at private sale and shall account to Contractor for the proceeds, after deducting all costs and damages that should have been borne by Contractor to correct the defective work, including all compensation for Design Consultant's services and expenses made necessary as a result of the sale, removal and storage. If the proceeds of sale do not cover the costs that Contractor should have borne, the Contract Sum shall be reduced by the deficiency. If payments due to

Contractor then or thereafter are not sufficient to cover the deficiency, Contractor shall pay the difference to Owner.

12.3.7 Contractor shall bear the cost of correcting destroyed or damaged construction of Owner or Owner's separate contractors, whether the construction is completed or partially completed, caused by Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

12.3.8 Nothing contained in this **Section 12.3** shall be construed to establish a period of limitation with respect to other obligations which Contractor might have under the Contract Documents. The establishment of the one (1) year time period, as described in **Section 12.3.2** relates only to the specific obligation of Contractor to correct the Work and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced or to the time within which proceedings may be commenced to establish Contractor's liability with respect to Contractor's obligations other than specifically to correct the Work.

12.3.9 Any Work repaired or replaced, pursuant to this **Article XII,** shall be subject to the provisions of **Article XII** to the same extent as Work originally performed or installed.

12.4 Acceptance of Nonconforming Work. Owner may, in Owner's sole discretion, accept Work that is not in accordance with the requirements of the Contract Documents instead of requiring its removal and correction. Upon that occurrence, the Contract Sum will be reduced as appropriate and equitable, as solely determined by Owner. Any adjustment will be accomplished whether or not final payment has been made.

ARTICLE XIII. COMPLETION OF THE CONTRACT; TERMINATION; TEMPORARY SUSPENSION

13.1 Final Completion Of Contract. The Contract will be considered completed, except as provided in any warranty or maintenance stipulations, bond or by law, when all the Work has been finally completed, a final inspection is made by Owner and Design Consultant and final acceptance and final payment is made by Owner.

13.2 Warranty Fulfillment. Prior to the expiration of the specified warranty period provided for in the Contract Documents, Owner or Design Consultant will make a detailed inspection of the Work and will advise Contractor and Contractor's Surety of the items that require correction. Owner or Design Consultant will make a subsequent inspection and, if the corrections have been properly performed, Owner will issue a letter of release on the maintenance obligations to Contractor. If, for any reason, Contractor has not made the required corrections before the expiration of the warranty period, the warranty provisions as provided for in the Contract Documents shall remain in effect until the corrections have properly been performed and a letter of release from Owner to Contractor is issued.

13.3 TERMINATION BY THE OWNER FOR CAUSE

13.3.1 Notwithstanding any other provision of these General Conditions, the Work or any portion of the Work may be terminated immediately by Owner for any good cause after giving seven (7) calendar days advance written notice and an opportunity to cure to Contractor, including but not limited to the following causes:

13.3.1.1 Failure or refusal of Contractor to start the Work within ten (10) calendar days after the date of the written Notice to Proceed is issued by Owner to Contractor commence Work.

13.3.1.2 A reasonable belief of Owner or Design Consultant that the progress of the Work being made by Contractor is insufficient to complete the Work within the specified Contract time.

13.3.1.3 Failure or refusal of Contractor to provide sufficient and proper equipment or construction forces properly to execute the Work in a timely manner.

13.3.1.4 A reasonable belief that Contractor has abandoned the Work.

13.3.1.5 A reasonable belief that Contractor has become insolvent, bankrupt, or otherwise is financially unable to carry on the Work.

13.3.1.6 Failure or refusal on the part of Contractor to observe any material requirements of the Contract Documents or to comply with any written orders given by Owner or Design Consultant, as provided for in the Contract Documents.

13.3.1.7 Failure or refusal of Contractor promptly to correct any defects in materials or workmanship, or defects of any nature, the correction of which has been directed to Contractor in writing by Owner or Design Consultant.

13.3.1.8 A reasonable belief by Owner that collusion exists or has occurred for the purpose of illegally procuring the contract or a Subcontractor, or that a fraud is being perpetrated on Owner in connection with the construction of Work under the Contract.

13.3.1.9 Repeated and flagrant violation of safe working procedures.

13.3.2 When the Work or any portion of the Work is terminated for any of the causes itemized in **Section 13.3.1** herein, or for any other cause except termination for convenience pursuant to **Section 13.3.5** herein, Contractor shall, as of the date specified by Owner, immediately discontinue the Work or portion of the Work as Owner shall designate, whereupon the Surety shall, within fifteen (15) calendar

days after the written Notice of Termination by Owner For Cause has been served upon Contractor and the Surety or its authorized agents, assume the obligations of Contractor for the Work or that portion of the Work which Owner has ordered Contractor to discontinue and Surety may:

13.3.2.1 perform the Work with forces employed by the surety;

13.3.2.2 with the written consent of Owner, tender a replacement Contractor to take over and perform the Work, in which event the Surety shall be responsible for and pay the amount of any costs required to be incurred for the completion of the Work that are in excess of the amount of funds remaining under the Contract as of the time of the termination; or

13.3.2.3 with the written consent of Owner, tender and pay to Owner in settlement the amount of money necessary to finish the balance of uncompleted Work under the Contract, correct existing defective or nonconforming work and compensate Owner for any other loss sustained as a result of Contractor's default.

In the event of Termination by Owner For Cause involving **Article 13.3.2.1** and/or **Article 13.3.2.2**, the Surety shall assume Contractor's place in all respects and the amount of funds remaining and unpaid under the Contract shall be paid by Owner for all Work performed by the Surety or the replacement contractor in accordance with the terms of the Contract Documents, subject to any rights of Owner to deduct any and all costs, damages or liquidated or actual damages that Owner incurred, including, but not limited to, any and all additional fees and expenses of Design Consultant and any attorneys fees Owner incurs as a result of Contractor's default and subsequent termination.

13.3.3 The balance of the Contract Sum remaining at the time of Contractor's default and subsequent termination shall become due and payable to the Surety as the Work progresses, subject to all of the terms, covenants and conditions of the Contract Documents. If the Surety does not, within the time specified in **Section 13.3.2** herein, exercise its obligation to assume the obligations of the Contract, or that portion of the Work which Owner has ordered Contractor to discontinue, then Owner shall have the power to complete the Work by contract or otherwise, as Owner may deem necessary and elect. Contractor agrees that Owner shall have the right to:

(1) take possession of or use any or all of the materials, plant, tools, equipment, supplies and property of every kind, to be provided by Contractor for the purpose of the Work; and

(2) procure other tools, equipment, labor and materials for the completion of the Work at Contractor's expense; and

(3) charge to the account of Contractor the expenses of completion and labor, materials, tools, equipment, and incidental expenses.

13.3.4 All expenses incurred by Owner to complete the Work shall be deducted by Owner out of the balance of the Contract Sum remaining unpaid to or unearned by Contractor. Contractor and the Surety shall be liable to Owner for any costs incurred in excess of the balance of the Contract Sum for the completion and correction of the Work, and for any other costs, damages, expenses (including, but not limited to, additional fees of Design Consultant and attorney's fees) and liquidated or actual damages incurred as a result of the termination.

13.3.5 Owner shall not be required to obtain the lowest bid for the Work of completing the Contract, as described in **Section 13.3.3** herein, but the expenses to be deducted from the Contract Sum shall be the actual cost of such Work and the other damages, as provided in **Section 13.3.3** herein. In case Owner's costs and damages are less than the sum which would have been payable under the Contract if the Work had been completed by Contractor pursuant to the Contract, then Owner may pay Contractor (or the Surety, in the event of a complete Termination by Owner For Cause) the difference, provided that Contractor (or the Surety) shall not be entitled to any claim for damages or for loss of anticipated profits. In case such costs for completion and damages shall exceed the amount which would have been payable under the Contract if the Work had been completed by Contractor pursuant to the Contract, then Contractor and its Surety shall pay the amount of the excess to Owner immediately upon written notice from Owner to Contractor and/or the Surety for the excess amount owed. When only a particular part of the Work is being carried on by Owner, by contract or otherwise under the provisions of this Section, Contractor shall continue the remainder of the Work in conformity with the terms of the Contract and in such manner as not to hinder or interfere with the performance of workmen employed and provided by Owner.

13.3.6 The right to terminate this Contract for the convenience of Owner (including, but not limited to, non-appropriation of funding) expressly is retained by Owner. In the event of a termination for convenience by Owner, Owner shall, at least ten (10) calendar days in advance, deliver written notice of the termination for convenience to Contractor. Upon Contractor's receipt of such written notice, Contractor immediately shall cease the performance of the Work and shall take reasonable and appropriate action to secure and protect the Work then in place. Contractor shall then be paid by Owner, in accordance with the terms and provisions of the Contract Documents, an amount not to exceed the actual labor costs incurred, the actual cost of all materials installed and the actual cost of all materials stored at the Project site or away from the Project site, as approved in writing by Owner but not yet paid for and which can not be returned, plus applicable overhead, profit, and actual, reasonable and documented termination costs, if any, paid by Contractor in connection with the Work in place which is completed and in conformance with the Contract Documents up to the date of termination for convenience, less all amounts previously paid for the Work. No amount ever shall be paid to Contractor for lost or anticipated profits on any part of the Work not performed.

13.4 TEMPORARY SUSPENSION OF THE WORK

13.4.1 The Work or any portion of the Work may temporarily be suspended by Owner, for a time period not to exceed ninety (90) calendar days, immediately upon written notice to Contractor for any reason, including, but not limited to:

13.4.1.1 the causes described in **Section 13.3.1.1** through **Section 13.3.1.9** herein;

13.4.1.2 under other provisions in the Contract Documents that require or permit temporary suspension of the Work;

13.4.1.3 situations where the Work is threatened by, contributes to or causes an immediate threat to public health, safety, or security; or

13.4.1.4 other unforeseen conditions or circumstances.

13.4.2 Contractor immediately shall resume the temporarily suspended Work when ordered in writing to do so by Owner. Owner shall not, under any circumstances, be liable for any claim of Contractor arising from a temporary suspension due to a cause described in **Section 13.4.1** herein; provided, however, that in the case of a temporary suspension for any of the reasons described under **Section 13.4.1.2** through **Section 13.4.1.4** herein, where Contractor is not a contributing cause of the suspension or where the provision of the Contract Documents in question does not specifically provide that the suspension is at no cost to Owner, Owner will make an equitable adjustment for the following items, provided that a claim properly is made by Contractor under **Section 4.3** herein:

13.4.2.1 an equitable extension of the Contract Time, not to exceed the actual delay caused by the temporary suspension, as determined by Owner and Design Consultant;

13.4.2.2 an equitable adjustment to the Contract Sum for the actual, necessary and reasonable costs of properly protecting any Work finished or partially finished during the period of the temporary suspension; provided, however, that no payment of profit and/or overhead shall be allowed on top of these costs; and

13.4.2.3 if it becomes necessary to move equipment from the Project Site and then return it to the Project Site when the Work is ordered to be resumed, an equitable adjustment to the Contract Sum for the actual, necessary and reasonable cost of these moves; provided, however, that no adjustment to the Contract Sum shall be due if said equipment is moved to another Project site of Owner.

ARTICLE XIV. MISCELLANEOUS PROVISIONS

14.1 Small Business Economic Development Advocacy. Contractor shall comply with the requirements of City's Small Business Economic Development Advocacy Office as posted in the Project's solicitation documents and the Contract Documents.

14.2 GOVERNING LAW; COMPLIANCE WITH LAWS AND REGULATIONS

14.2.1 This Contract shall be governed by the laws and case decisions of the State of Texas, without regard to conflict of law or choice of law principles of Texas or of any other state.

14.2.2 This Contract is entered into subject to and controlled by the Charter and ordinances of the City of San Antonio and all applicable laws, rules and regulations of the State of Texas and the Government of the United States of America. Contractor shall, during the performance of the Work, comply with all applicable City of San Antonio codes and ordinances, as amended, and all applicable State of Texas and Federal laws, rules and regulations, as amended.

14.3 SUCCESSORS AND ASSIGNS. Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the promises, covenants, terms, conditions and obligations contained in the Contract Documents. Contractor shall not assign, transfer or convey its interest or rights in the Contract, in part or as a whole, without the written consent of Owner. If Contractor attempts to make an assignment, transfer or conveyance without Owner's written consent, Contractor nevertheless shall remain legally responsible for all obligations under the Contract Documents. Owner shall not assign any portion of the Contract Sum due or to become due under this Contract without the written consent of Contractor, except where assignment is compelled by court order, other operation of law or the terms of these General Conditions.

14.4 WRITTEN NOTICE. Any notice, payment, statement or demand required or permitted to be given under this Contract by either party to the other may be effected by personal delivery in writing or by facsimile transmission, email or by mail, postage prepaid, or by overnight delivery to an officer, management level employee or other designated representative of either party. Mailed or email notices shall be addressed to the parties at an address designated by each party, but each party may change its address by written notice in accordance with this section. Mailed notices shall be deemed received as of three (3) calendar days after mailing.

14.5 RIGHTS AND REMEDIES; NO WAIVER OF RIGHTS BY OWNER

14.5.1 The duties and obligations imposed on Contractor by the Contract Documents and the rights and remedies available to Owner under the Contract Documents shall be in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or made available by law.

14.5.2 No action or failure to act by Owner shall constitute a waiver of a right afforded Owner under the Contract Documents, nor shall any action or failure to act by Owner constitute approval of or acquiescence in a breach of the Contract by

Contractor, except as may be specifically agreed in writing by Change Order, Amendment or Supplemental Agreement.

14.6 Interest. Owner shall not be liable for interest on any progress or final payment to be made under the Contract Documents, except as may be provided by the applicable provisions of the Prompt Payment Act, Chapter 2251, Texas Government Code, as amended, subject to **Article IX** of these General Conditions.

14.7 INDEPENDENT MATERIALS TESTING AND INSPECTION

14.7.1 In some circumstances, Owner shall retain, independent of Contractor, the inspection services, the testing of construction materials engineering and the verification testing services necessary for acceptance of the Project by Owner. Such consultants will be selected in accordance with Section 2254.004 of the Government Code. The professional services, duties and responsibilities of any independent consultants will be described in the agreements between Owner and those consultants. The provision of inspection services by Owner will be for Quality Assurance and shall not reduce or lessen Contractor's responsibility for the Work or its duty to establish and implement a thorough Quality Control Program to monitor the quality of construction and guard the Owner against defects and deficiencies in the Work, as required herein. Contractor fully and solely is responsible for constructing the Project in strict accordance with the Construction Documents.

14.8 OFFICERS OR EMPLOYEES OF THE OWNER NOT TO HAVE FINANCIAL INTEREST IN ANY CONTRACT OF THE OWNER. Contractor acknowledges the Charter of the City of San Antonio and its Ethics Code prohibits a City officer or employee, as those terms are defined in Section 2-52 of the Ethics Code, from having a financial interest in any contract with the City or any City agency, such as City-owned utilities. An officer or employee has a "prohibited financial interest" in a contract with the City or in the sale to the City of land, materials, supplies or service, if any of the following individual(s) or entities is a party to the contract or sale:

(1) a City officer or employee; his parent, child or spouse;

(2) a business entity in which the officer or employee, or his parent, child or spouse owns ten (10) percent or more of the voting stock or shares of the business entity, or ten (10) percent or more of the fair market value of the business entity;

(3) a business entity in which any individual or entity above listed is a Subcontractor on a City contract, or

(4) a partner or a parent or subsidiary business entity.

Pursuant to this **Article XIV**, Contractor warrants and certifies, and this Contract is made in reliance thereon, that it, its officers, employees and/or agents are neither officers nor employees of Owner. Except with Owner's low-bid contract

awards, Contractor warrants and certifies that it has tendered to Owner a Discretionary Contracts Disclosure Statement in compliance with Owner's Ethics Code. Any violation of this article shall constitute malfeasance in office and any officer or employee of Owner guilty thereof shall thereby forfeit his office or position. Any violation of this **Section 14.8**, with the knowledge, express or implied, of the person, persons, partnership, company, firm, association or corporation contracting with Owner shall render a Contract voidable by the Owner's City Manager or City Council.

14.9 Venue. This Contract is performed in Bexar County, Texas, and if legal action is necessary to enforce this Contract, exclusive venue shall lie in Bexar County, Texas.

14.10 INDEPENDENT CONTRACTOR. In performing the Work under this Contract, the relationship between Owner and Contractor is that of an independent contractor. Contractor shall exercise independent judgment in performing the Work and solely is responsible for setting working hours, scheduling and/or prioritizing the Work flow and determining the means and methods of performing the Work, subject only to the requirements of the Contract Documents. No term or provision of this Contract shall be construed as making Contractor an agent, servant or employee of Owner or making Contractor or any of Contractor's employees, agents or servants eligible for the fringe benefits, such as retirement, insurance and worker's compensation which Owner provides to its employees.

14.11 NONDISCRIMINATION. As a condition of this Contract, Contractor covenants that it will take all necessary actions to insure that, in connection with any Work under this Contract, Contractor and its Subcontractor(s) will not discriminate in the treatment or employment of any individual or groups of individuals on the grounds of race, color, religion, national origin, age, sex or handicap unrelated to job performance, either directly, indirectly or through contractual or other arrangements. Contractor also shall comply with all applicable requirements of the Americans with Disabilities Act, 42 U.S.C.A. §§12101-12213, as amended. In this regard, Contractor shall keep, retain and safeguard all records relating to this Contract or Work performed there under, for a minimum period of four (4) years from Final Completion, unless there is an ongoing dispute under the Contract, then, such retention period shall extend until final resolution of the dispute, with full access allowed to authorized representatives of Owner upon request, for purposes of evaluating compliance with this and other provisions of the Contract.

14.12 GIFTS TO PUBLIC SERVANTS

14.12.1 Owner may terminate this Contract immediately if Contractor has offered, conferred or agreed to confer any benefit on a City of San Antonio employee or official that the employee or official is prohibited by law from accepting.

14.12.2 For purposes of this Article, "benefit" means anything reasonably regarded as pecuniary gain or pecuniary advantage, including benefit to any other person in whose welfare the beneficiary has a direct or substantial interest, but does not

include a contribution or expenditure made and reported in accordance with law.

14.12.3 Notwithstanding any other legal remedies, Owner may require Contractor to remove any employee of Contractor, a Subcontractor or any employee of a Subcontractor from the Project who has violated the restrictions of this **Article XIV** or any similar State or Federal law and Owner may obtain reimbursement for any expenditures made to Contractor as a result of an improper offer, an agreement to confer or the conferring of a benefit to a City of San Antonio employee or official.

ARTICLE XV. AUDIT

15.1 RIGHT TO AUDIT CONTRACTOR'S RECORDS

15.1.1 By execution of the Contract, Contractor grants Owner the right to audit, examine, inspect and/or copy, at Owner's election at all reasonable times during the term of this Contract and for a period of four (4) years following the completion or termination of the Work, all of Contractor's written and electronically stored records and billings relating to the performance of the Work under the Contract Documents. The audit, examination or inspection may be performed by an Owner designee, which may include its internal auditors or an outside representative engaged by Owner. Contractor agrees to retain its records for a minimum of four (4) years following termination of the Contract, unless there is an ongoing dispute under the Contract, then, such retention period shall extend until final resolution of the dispute. As used in these General Conditions, "Contractor written and electronically stored records" include any and all information, materials and data of every kind and character generated as a result of the work under this Contract. Example of Contractor written and electronically stores records include, but are not limited to: accounting data and reports, billings, books, general ledgers, cost ledgers, invoices, production sheets, documents, correspondences, meeting notes, subscriptions, agreements, purchase orders, leases, contracts, commitments, arrangements, notes, daily diaries, reports, drawings, receipts, vouchers, memoranda, time sheets, payroll records, policies, procedures, Subcontractor agreements, Supplier agreements, rental equipment proposals, federal and state tax filings for any issue in question, along with any and all other agreements, sources of information and matters that may, in Owner's sole judgment, have any bearing on or pertain to any matters, rights, duties or obligations under or covered by any Agreement Documents.

15.1.2 Owner agrees that it will exercise the right to audit, examine or inspect Contractor's records only during regular business hours. Contractor agrees to allow Owner and/or Owner's designee access to all of the Contractor's Records,

Contractor's facilities and current or former employees of Contractor, deemed necessary by Owner or its designee(s), to perform such audit, inspection or examination. Contractor also agrees to provide adequate and appropriate work space necessary for Owner or its designees to conduct such audits, inspections or examinations.

15.1.3 Contractor shall include this **Article XV** in any Subcontractor, supplier or vendor contract.

Special Conditions for Horizontal Projects

3.2.5 Differing Site Conditions (Adds Section 3.2.5 to City's General Conditions)

Contractor promptly shall, before such discovered conditions and/or structures are disturbed, notify Owner in writing of differing site conditions. Differing site conditions are defined as subsurface or latent physical and/or structural conditions at the Site differing materially from those indicated in the Plans, Specifications and other Contract Documents or newly discovered and previously unknown physical conditions at the Site of an unusual nature differing materially from those geophysical conditions typically encountered in the type Work being performed and generally being recognized as not indigenous to the San Antonio, Bexar County, Texas environs.

Owner and/or Design Consultant promptly shall investigate the reported physical and/or structural conditions and shall determine whether or not the physical and/or structural conditions do materially so differ and thereby cause an increase or decrease in Contractor's cost of and/or time required for performance of any part of the Work under this Contract. In the event that Owner reasonably determines that the physical and/or structural conditions materially so differ, a negotiated and equitable adjustment shall be made to the Contract Time and/or Contract Sum and a Change Order promptly shall be issued by Owner.

(1) No claim of Contractor under this **Section 3.2.5** shall be allowed unless Contractor has given the written notice called for above, prior to disturbing the discovered conditions and/or structures.

(2) No Contract adjustment shall be allowed under this **Section 3.2.5** for any effects caused on unchanged work.

3.4.7 Material Testing (Added to Section 3.4.7 of City's General Conditions)

Materials not meeting Contract requirements or that do not produce satisfactory results will be rejected by Owner, unless Owner or Design Consultant approves corrective actions. Upon rejection, Contractor immediately shall remove and replace rejected materials. If Contractor does not comply with these requirements, Owner may remove and replace defective material and all costs incurred by Owner for testing, removal and replacement of rejected materials shall be deducted from any money due or owed to Contractor.

The source of supply of each of the materials shall be approved by Owner or Design Consultant before delivery is started and, at the option of Owner, may be sampled and tested by Owner for determining compliance with the governing specifications before delivery is started. If it is found after trial that sources of supply previously approved do not produce uniform and satisfactory products, or if the product from any source proves unacceptable at any time, Contractor shall furnish materials from other approved sources. Only materials conforming to the requirements of the Contract documents and approved by Owner shall be used by Contractor in the work. All materials being used by Contractor are subject to inspection or test at any time during preparation or use. Any material which has been tested and accepted at the source of

supply may be subjected to a check test after delivery and all materials which, when retested, do not meet the requirements of the specifications will be rejected. No material which, after approval, has in any way become unfit for use shall be used in the Work.

If, for any reason, Contractor selects a material which is approved for use by Owner or Design Consultant by sampling, testing or other means, and Contractor decides to change to a different material requiring additional sampling and testing by Owner for approval, Contractor shall pay for any expense incurred by Owner for such additional sampling and testing and the costs incurred by Owner shall be deducted from any money due or owed to Contractor.

4.3.8 Change in Unit Prices (Added to Section 4.3.8 of City's General Conditions)

Unit prices established in the Contract documents only may be modified when a Change Order or Field Work Directive causes a material change in quantity to a Major Bid Item. A Major Bid Item is defined as a single bid item that constitutes a minimum of five percent (5%) of the total contract value. A material change in quantity is defined as an increase or decrease of twenty five percent (25%) or more of the units of an individual bid item or an increase or decrease of twenty five percent (25%) or more of the dollar value of a lump sum bid item. Revised unit pricing only shall apply to the quantity of a major bid item in excess of a twenty five percent (25%) increase or decrease of the original Contract quantity.

7.2.5 Allowable Markups (Added to Section 7.2.5 of City's General Conditions)

Maximum allowable markups for Change Order pricing, when said pricing is not determined through unit prices, are established as follows:

7.2.5.1 Labor

Contractor shall be allowed the documented payroll rates for each hour laborers and foremen actually shall be engaged in the Work. Contractor shall be allowed to receive an additional twenty five percent (25%) as compensation, based on the total wages paid said laborers and foremen. No charge shall be made by Contractor for organization or overhead expenses. For costs of premiums on public liability and workers compensation insurance(s), Social Security and unemployment insurance taxes, an amount equal to fifty five percent (55%) of the sum of the labor cost, excluding the twenty five percent (25%) documented payroll rate compensation allowed herein, shall be the established maximum allowable labor burden cost. No charge for superintendence will be made unless considered necessary and approved by Owner or a Change Order includes an extension of the Contract Time.

7.2.5.2 Materials

Contractor shall be allowed to receive the actual cost, including freight charges, for materials used on such Work, including an additional twenty

five percent (25%) of the actual cost as compensation. When material invoices indicate an available discount, the actual cost shall be determined as the invoiced price less the available discount.

7.2.5.3 Equipment

For Contractor-owned machinery, trucks, power tools or other equipment, necessary for use on Change Order work, the Rental Rate Blue Book for Construction Equipment (hereafter referred to as "Blue Book") rate, as modified by the following, will be used to establish Contractor's allowable hourly rental rates. Equipment used shall be at the rates in effect for each section of the Blue Book at the time of use. The following formula shall be used to compute the hourly rates:

$$H = \frac{M \times R1 \times R2}{176} + OP$$

Where
H = Hourly Rate
M = Monthly Rate
R1 = Rate Adjustment Factor
R2 = Regional Adjustment Factor
OP = Operating Costs

If Contractor-owned machinery and/or equipment is not available and equipment is rented from an outside source, the hourly rate shall be established by dividing the actual invoice cost by the actual number of hours the equipment is involved in the Work. Owner reserves the right to limit the hourly rate to comparable Blue Book rates. When the invoice specifies that the rental rate does not include fuel, lubricants, repairs and servicing, the Blue Book hourly operating cost shall be allowed to be added for each hour the equipment operates. The allowable equipment hourly rates shall be paid for each hour that the equipment is involved in the Work and an additional maximum of fifteen percent (15%) may be added as compensation.

7.2.5.4 Subcontractor Markups

Contractor will be allowed administrative cost only when extra work, ordered by Owner, is performed by a Subcontractor or Subcontractors. The maximum allowable payment for administrative cost will not exceed five percent (5%) of the total Subcontractor work. Off-duty peace officers and patrol cruisers shall be considered as Subcontractors, with regard to consideration of allowable contractor markups.

7.3.9 Field Work Directive Allowable Markups (Adds Section 7.3.9 to City's General Conditions)

Maximum allowable markups for Field Work Directives shall follow the allowable markups established in Section 7.2.5 herein.

8.2.2 Standby Equipment Costs (Added to Section 8.2.2 of City's General Conditions)

Contractor shall be entitled to standby costs only when directed to standby in writing by Owner. Standby costs may include actual documented Project overhead costs of Contractor, consisting of administrative and supervisory expenses incurred at the Project Site. Standby equipment costs shall not be allowed during periods when the equipment would otherwise have been idle.

No more than eight (8) hours of standby time shall be paid during a 24-hour day, no more than forty (40) hours shall be paid per week for standby time and no more than one hundred and seventy six (176) hours per month shall be paid of standby time. Standby time shall be computed at fifty percent (50%) of the rates found in the Rental Rate Blue Book for Construction Equipment and shall be calculated by dividing the monthly rate found in the Blue Book by 176, then multiplying that total by the regional adjustment factor and the rate adjustment factor. Operating costs shall not be charged by Contractor.

10.11 Road Closures and Detour Routes (Adds Section 10.11 to City's General Conditions)

Contractor shall not begin construction of the Project or close any streets until adequate barricades and detour signs have been provided, erected and maintained in accordance with the detour route and details shown on the Project Plans. Contractor shall notify Owner forty eight (48) hours in advance of closing any street to through traffic. Local traffic shall be permitted the use of streets under construction whenever feasible.

10.12 Use of City Streets (Adds Section 10.12 to City's General Conditions)

Contractor shall confine the movements of all steel-tracked equipment to the limits of the Project Site and any such equipment shall not be allowed use of Owner's streets unless being transported on pneumatic-tired vehicles. Any damage to Owner's streets caused by Contractor and/or Contractor's equipment, either outside the limits of the Project site or within the limits of the Project site but not within the limits of the current phase then being constructed, shall be repaired by Contractor at its own expense and as prescribed by Owner's specifications and direction. If Contractor can not or refuses to repair street damage caused by Contractor and/or Contractor's equipment, Owner may perform the repairs and all expenses incurred by Owner in performing the repairs shall be deducted for any money due or owed to Contractor.

10.13 Maintenance of Traffic (Adds Section 10.13 to City's General Conditions)

In accordance with the approved traffic control plan and as specified in the Contract, Contractor shall:

(1) keep existing roadways open to traffic or construct and maintain detours and temporary structures for safe public travel;

(2) maintain the Work in passable condition, including proper drainage, to accommodate traffic;

(3) provide and maintain temporary approaches and crossings of intersecting roadways in a safe and passable condition;

(4) construct and maintain necessary access to adjoining property as shown in the plans or as directed by Owner; and

(5) furnish, install and maintain traffic control devices in accordance with the Contract.

The cost of maintaining traffic will be subsidiary to the Project and will not directly be paid for by Owner, unless otherwise stated in the Plans and Specifications. Owner will notify Contractor if Contractor fails to meet the above traffic requirements. Owner may perform the work necessary for compliance, but any action n by Owner shall not change the legal responsibilities of Contractor, as set forth in the Contract Documents. Any costs incurred by Owner for traffic maintenance shall be deducted from money due or owed to Contractor.

10.14 Abatement and Mitigation of Excessive or Unnecessary Construction Noise (Adds Section 10.14 City's General Conditions)

Contractor shall ensure abatement and mitigation of excessive or unnecessary construction noise to the satisfaction of Owner and as prescribed by all applicable state and local laws.

10.15 Incidental Work, Connections, and Passageways (Adds Section 10.15 City's General Conditions)

Contractor shall perform all incidental Work necessary to complete and comply with this Contract including, but not limited to the following:

(1) Contractor shall make and provide all suitable reconnections with existing improvements (generally excluding new connections with or relocation of utility services, unless specifically provided for otherwise in the Contract Documents) as are necessarily incidental to the proper completion of the Project;

(2) Contractor shall provide passageways or leave open such thoroughfares in the Work Site as may be reasonably required by Owner; and

(3) Contractor shall protect and guard same at its own risk and continuously shall maintain the Work Site in a clean, safe and workmanlike manner.

SECTION 105

WAGE DECISION NUMBERS

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General Decision Number: TX130016 01/04/2013 TX16

Superseded General Decision Number: TX20120016

State: Texas

Construction Types: Heavy and Highway

Counties: Atascosa, Bandera, Bastrop, Bell, Bexar, Brazos, Burleson, Caldwell, Comal, Coryell, Guadalupe, Hays, Kendall, Lampasas, McLennan, Medina, Robertson, Travis, Williamson and Wilson Counties in Texas.

HEAVY (excluding tunnels and dams, not to be used for work on Sewage or Water Treatment Plants or Lift / Pump Stations in Bell, Coryell, McClennon and Williamson Counties) and HIGHWAY Construction Projects

Modification Number	Publication Date
0	01/04/2013

* SUTX2011-006 08/03/2011

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER (Paving and Structures)	$ 12.56	
ELECTRICIAN	$ 26.35	
FORM BUILDER/FORM SETTER		
Paving & Curb	$ 12.94	
Structures	$ 12.87	
LABORER		
Asphalt Raker	$ 12.12	
Flagger	$ 9.45	
Laborer, Common	$ 10.50	
Laborer, Utility	$ 12.27	
Pipelayer	$ 12.79	
Work Zone Barricade Servicer	$ 11.85	
PAINTER (Structures)	$ 18.34	
POWER EQUIPMENT OPERATOR:		
Agricultural Tractor	$ 12.69	
Asphalt Distributor	$ 15.55	
Asphalt Paving Machine	$ 14.36	
Boom Truck	$ 18.36	
Broom or Sweeper	$ 11.04	
Concrete Pavement Finishing Machine	$ 15.48	
Crane, Hydraulic 80 tons or less	$ 18.36	
Crane, Lattice Boom 80		

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     tons or less.............$ 15.87
     Crane, Lattice Boom over
     80 tons..................$ 19.38
     Crawler Tractor..........$ 15.67
     Directional Drilling
     Locator..................$ 11.67
     Directional Drilling
     Operator.................$ 17.24
     Excavator 50,000 lbs or
     Less.....................$ 12.88
     Excavator over 50,000 lbs...$ 17.71
     Foundation Drill, Truck
     Mounted..................$ 16.93
     Front End Loader, 3 CY or
     Less.....................$ 13.04
     Front End Loader, Over 3 CY.$ 13.21
     Loader/Backhoe...........$ 14.12
     Mechanic.................$ 17.10
     Milling Machine..........$ 14.18
     Motor Grader, Fine Grade....$ 18.51
     Motor Grader, Rough.....$ 14.63
     Pavement Marking Machine....$ 19.17
     Reclaimer/Pulverizer.....$ 12.88
     Roller, Asphalt..........$ 12.78
     Roller, Other............$ 10.50
     Scraper..................$ 12.27
     Spreader Box.............$ 14.04
     Trenching Machine, Heavy....$ 18.48

Servicer.....................$ 14.51

Steel Worker
     Reinforcing..............$ 14.00
     Structural...............$ 19.29

TRAFFIC SIGNAL INSTALLER
     Traffic Signal/Light Pole
     Worker...................$ 16.00

TRUCK DRIVER
     Lowboy-Float.............$ 15.66
     Off Road Hauler..........$ 11.88
     Single Axle..............$ 11.79
     Single or Tandem Axle Dump
     Truck....................$ 11.68
     Tandem Axle Tractor w/Semi
     Trailer..................$ 12.81

WELDER.......................$ 15.97
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WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.

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

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

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination.

The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

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

0000/9999: weighted union wage rates will be published annually each January.

Non-Union Identifiers

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

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

WAGE DETERMINATION APPEALS PROCESS

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

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

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

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

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

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

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

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

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

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

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

==========

END OF GENERAL DECISION

FLM:GG [11/20/08]
Item No. 33.

AN ORDINANCE 2008-11-20-1045

AMENDING ORDINANCE 71312 CONCERNING WAGE AND HOUR LABOR STANDARD PROVISIONS FOR CITY OF SAN ANTONIO CONSTRUCTION PROJECTS.

* * * * *

WHEREAS, federal and state laws require that all companies working on publicly funded construction projects must pay prevailing wage rates to its contractor and subcontractor employees, as determined by the U.S. Department of Labor; and

WHEREAS, governing procedures were established to ensure the City's compliance with various state laws through Ordinance No. 71312 approved on March 29, 1990 which provided for the Wage and Labor Standard Provision for locally funded City construction projects; and

WHEREAS, there have been changes in state law, as well as, organizational and process changes within the City that necessitate an amendment to Ordinance No. 71312; and

WHEREAS, this Ordinance amends Ordinance No. 71312 to a) reflect the changes in the Texas Government Code, Section 2258, Prevailing Wages, (superseding Article 5159a, Revised Civil Statutes), b) incorporate changes in the City's organizational structure renaming the Wage and Hour Office of the Public Works Department to the Labor Compliance Office, Capital Improvements Management Services Department, c) reflect changes in the City processes and the implementation of an electronic compliance program, and d) clarify language and eliminate ambiguities in the Ordinance, including the processes used by contractors for the restitution of underpayment of wages to workers whose contact information or current address is unknown; and

WHEREAS, approval of this Amendment will accurately reflect current laws, City organizational structure and current processes; **NOW THEREFORE,**

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF SAN ANTONIO:

SECTION 1. Ordinance No. 71312 concerning Wage and Hour Labor Standard Provisions for City of San Antonio construction projects are hereby amended and the amended Wage and Labor Standard Provisions are attached hereto and incorporated by reference herein as Attachment I.

SECTION 2. This Ordinance shall take effect ten days after passage.

PASSED AND APPROVED this **20th** day of **November**, **2008.**

M A Y O R
PHIL HARDBERGER

ATTEST: Leticia M. Vacek
City Clerk

APPROVED AS TO FORM: [signature]
FLM City Attorney for

CORRECTED (7-15-2010)

WAGE AND LABOR STANDARD PROVISIONS

CITY OF SAN ANTONIO FUNDED CONSTRUCTION

Contents

Attachment I

1. GENERAL STATEMENT

For all City of San Antonio funded public works construction contracts, the City of San Antonio, in accordance with Texas Government Code Section 2258, requires that not less than the general prevailing wage rates (minimum hourly base pay and minimum hourly fringe benefit contribution) for work of similar character be paid to contractor and subcontractor employees. These wage rates are derived from the most current applicable federal prevailing wage rates as published by the United States Department of Labor, Dallas, Texas and authority of Ordinance Nos. 60110 and 71312 as amended and passed by the City Council of the City of San Antonio.

Any deviation from Wage and Labor Standard Provisions compliance shall be cause for City's withholding either periodic interim or final payment to the contractor until such deviations are properly corrected.

2. LABOR COMPLIANCE OFFICE, CAPITAL IMPROVEMENTS MANAGEMENT SERVICES DEPARTMENT RESPONSIBILITIES

Labor Compliance Office, Capital Improvements Management Services Department, City of San Antonio, is primarily responsible for all Wage and Labor Standard Provisions investigation and enforcement and will monitor contractor/subcontractor practices to assure the Director of Capital Improvements Management Services Department that:

a. Appropriate weekly compliance statements and payroll records are submitted to the City by the contractor/subcontractors and that such are reviewed for compliance with the Wage and Labor Standard Provisions.

b. Apprentices/trainees working on the project are properly identified by the contractor/subcontractor on payroll records and documented as being included in programs currently sanctioned by appropriate federal or state regulatory agencies.

c. Applicable Wage Determination Decisions, including any applicable modifications and related statements must be posted at the work-site by the contractor and that proper job classification and commensurate minimum hourly base and fringe wage rates are paid.

d. Employees are periodically interviewed (at random) to assure proper work classification and wage rates.

e. The Labor Compliance Office will investigate all allegations that no person employed by contractor/subcontractor is induced against his will, by any means, to give up any part of the compensation to which he is otherwise entitled.

f. That any and all periodic administrative directives to the Labor Compliance Office from the Director of Capital

Improvements are being implemented. For purpose of these Wage and Labor Standard Provisions, the Director of Capital Improvements Management Services means the Director, his successor, or his designee.

3. CLAIMS & DISPUTES PERTAINING TO WAGE RATES

Claims and disputes not promptly and routinely settled by the contractor/subcontractor and employee pertaining to wage rates, or to job classifications of labor employed regarding the work covered by this contract, shall be reported by the employee in writing, within sixty (60) calendar days of employee's receipt of any allegedly incorrect classification, wage or benefit report, to the Labor Compliance Office, City of San Antonio for further investigation. Claims and disputes not reported by the employee to the City's Wage & Hour Office in writing within the sixty (60) calendar day period shall be deemed waived by the employee for the purposes of the City administering and enforcing the City's contract rights against the contractor on behalf of the employee. Waiver by the employee of this City intervention shall not constitute waiver by the City to independently pursue contractual rights it has against the contractor/subcontractor for breach of contract and other sanctions available to enforce the Wage and Labor Standard Provisions.

4. BREACH OF WAGE & LABOR STANDARD PROVISIONS

The City of San Antonio reserves the right to terminate a contract for cause if the contractor/subcontractors shall knowingly and continuously breach, without timely restitution or cure, any of these governing Wage and Labor Standard Provisions. A knowing and unremedied proven violation of these Wage and Labor Standard Provisions may also be grounds for debarment of the contractor/subcontractor from future City of San Antonio contracts for lack of responsibility, as determined by the City of San Antonio. Recurrent violations, whether remedied or not, will be considered by the Director of Capital Improvements Management Services Department when assessing the responsibility history of a potential contractor/subcontractor prior to competitive award of future Project Management Office projects. The general remedies stated in this paragraph 4. above, are not exhaustive and not cumulative for the City reserves legal and contractual rights to other specific remedies outlined herein below and in other parts of this contract and as are allowed by applicable City of San Antonio ordinances, state and federal statutes.

5. EMPLOYMENT OF LABORERS/MECHANICS NOT LISTED IN WAGE DETERMINATION DECISION

In the event that a contractor/subcontractor discovers that construction of a particular work element requires a certain employee classification and skill that is not listed in the wage determinations decision contained in the original contract documents, contractor/subcontractors will make prompt inquiry

(before bidding, if possible) to the Labor Compliance Office identifying that class of laborer/mechanics not listed in the wage determination decision who are intended to be employed, or who are being employed, under the contract. Using his best judgment and information resources available to him at the time, and any similar prior decisions, the Director of Capital Improvements Management Services Department, City of San Antonio shall classify said laborers/mechanics by issuing a special local wage determination decision to the contractor/subcontractor, which shall be enforced by the Labor Compliance Office.

6. MINIMUM WAGE

All laborers/mechanics employed to construct the work governed by this contract shall be paid not less than weekly the full amount of wages due (minimum hourly base pay and minimum hourly fringe benefit contribution for all hours worked, including overtime) for the immediately preceding pay period computed at wage and fringe rates not less than those contained in the wage determination decision included in this contract. Only payroll deductions as are mandated by state or federal law and those legal deductions previously approved in writing by the employee, or as are otherwise permitted by state or federal law, may be withheld by the contractor/subcontractor.

Should the contractor/ subcontractor subscribe to fringe benefit programs for employees, such programs shall be fully approved by the City in adopting a previous U.S. Department of Labor (DOL) decision on such fringe benefit programs or by applying DOL criteria in rendering a local decision on the adequacy of the fringe benefit programs. The approved programs shall be in place at the time of City contract execution and provisions thereof disclosed to the Labor Compliance Office, City of San Antonio, for legal review prior to project commencement.

Regular contractor/subcontractor contributions made to, or costs incurred for, approved fringe benefit plans, funds or other benefit programs that cover periods of time greater than the one week payroll periods of time period (e.g. monthly or quarterly, etc.) shall be prorated by the contractor/subcontractor on weekly payroll records to reflect the equivalent value of the hourly and weekly summary of fringe benefits per employee.

7. OVERTIME COMPENSATION

No contractor/subcontractor contracting for any part of the City of San Antonio funded contract work (except for worksite related security guard services) which may require or involve the employment of laborers/mechanics shall require or permit any laborer/mechanic in any seven (7) calendar day work period in which he or she is employed on such work to work in excess of 40 hours in such work period unless said laborer/mechanic receives compensation at a rate not less than one and one-half times the basic hourly rate of pay for all hours worked in

excess of 40 hours in a seven (7) calendar day work period. Fringe benefits must be paid for straight time and overtime; however, fringe benefits are not included when computing the overtime rate.

8. PAYMENT OF CASH EQUIVALENT FRINGE BENEFITS

The contractor/subcontractor is allowed to pay a minimum hourly cash equivalent of minimum hourly fringe benefits listed in the wage determination decision in lieu of the contribution of benefits to a permissible fringe benefit plan for all hours worked including overtime as described in paragraph 6 above. An employee is not allowed to receive less than the minimum hourly basic rate of pay specified in the wage determination decision.

9. WORK CONDUCTED ON HOLIDAYS

If a laborer/mechanic is employed in the normal course and scope of his or her work on the jobsite on the following holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, Christmas Day, and Martin Luther King, Jr. Day, or the calendar days observed as such in any given year, work performed shall be paid for at no less than one and one half (1 1/2) times the regular minimum hourly base pay regardless of the total number of the laborer/mechanic has accumulated during the pay period.

10. UNDERPAYMENT OF PREVAILING WAGES OR SALARIES

a. When a "full investigation" (as called for in and as construed under Texas Government Code Section 2258) establishes underpayment of wages by contractor/ subcontractor to laborers/mechanics employed upon the work covered by a contract with the City of San Antonio, the City shall withhold an amount from the contractor, out of any payments (Interim progress and/or final) due the contractor, the City of San Antonio may also consider it necessary to secure ultimate payment by the appropriate party to such laborers/mechanics, of full wages plus possible penalty (see b. below). The amount withheld, excluding any possible penalty to be retained by City, may be disbursed at an appropriate time after "full investigation" by the City of San Antonio, for and on behalf of the contractor/subcontractor (as may be appropriate), to the respective laborers/mechanics to whom the same is due or on their behalf to fringe benefit plans, funds or programs for any type of minimum fringe benefits prescribed in the applicable wage determination decision.

b. Texas Government Code Section 2258, states that the contractor shall forfeit as a penalty to the City of San Antonio the sum of sixty dollars ($60.00) for each calendar day, or portion thereof, for each laborer, workman, or mechanic, who is paid less than the said stipulated rate for any work done under this contract, whether by the contractor himself or by any subcontractor working under him. Pursuant to and supplemental to this statutory authority, the City of

San Antonio and the contractor/subcontractor contractually acknowledge and agree that said sixty dollar ($60.00) statutory penalty shall be construed by and between the City of San Antonio and the contractor/subcontractor as liquidated damages and will apply to any violations of paragraphs 6, 7, or 9 herein, resulting from contractor/subcontractor underpayment violations.

c. If unpaid or underpaid workers cannot be located by the Contractor or the City after diligent efforts to accomplish same, the contractor shall report the wages as "unclaimed property" in accordance to Texas State law.

The City of San Antonio requires that the prime contractor send to the Labor Compliance Office a copy of the supporting documentation for the unclaimed property submitted to the State.

11. POSTING WAGE DETERMINATION DECISIONS/AND NOTICE TO LABORERS/MECHANICS STATEMENT

The applicable wage determination decision as described in the "General Statement" (and as specifically included in each project contract), outlining the various worker classifications and mandatory minimum wages and minimum hourly fringe benefit deductions, if any, of laborers/mechanics employed and to be employed upon the work covered by this contract, shall be displayed by the contractor/subcontractor at the site of work in a conspicuous and prominent public place readily and routinely accessible to workmen for the duration of the project. In addition, the contractor/subcontractor agrees with the contents of the following statement, and shall display same, in English and Spanish, near the display of the wage determination decision:

NOTICE TO LABORERS/MECHANICS

Both the City of San Antonio and the contractor/subcontractor agree that you must be compensated with not less than the minimum hourly base pay and minimum hourly fringe benefit contribution in accordance with the wage rates publicly posted at this jobsite and as are applicable to the classification of work you perform.

Additionally, you must be paid not less than one and one-half times your basic hourly rate of pay for any hours worked over 40 in any seven (7) calendar day work period, and for any work conducted on the following holidays: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day, and Martin Luther King Day or the calendar days observed as such in any given year.

Apprentice and trainee hourly wage rates and ratios apply only to apprentices and trainees recognized under approved Federal, or State, apprenticeship training program registered with the Bureau of Apprenticeship and Training, U.S. Dept. of Labor.

If you believe that your employer is not paying the posted minimum wage for the type of work you do, you must make direct inquiry to the employer and inquire in writing within sixty (60) calendar days of your receipt of any allegedly incorrect wage or benefit check or report, to the City of San Antonio Labor Compliance Office, Capital Improvements Management Services Department, P.O. Box 839966, San Antonio, Texas 78283-3966. It is mandatory that the worker promptly file written inquiry of any allegedly incorrect wage or benefit checks or reports with the City of San Antonio, Labor Compliance Office within the sixty (60) calendar day period so that they do not waive your potential right of recovery under the provisions of the City of San Antonio Project Management Office contract that governs this project.

Both the City of San Antonio and the contractor/subcontractor agree that no laborer/mechanic who files a complaint or inquiry concerning alleged underpayment of wages or benefits shall be discharged by the employer or in any other manner be discriminated against by the employer for filing such complaint or inquiry.

12. PAYROLLS & BASIC PAYROLL RECORDS

a. The contractor and each subcontractor shall prepare payroll reports in accordance with the "General Guideline" instructions furnished by the Labor Compliance Office of the City of San Antonio. Such payroll submittals shall contain the name and address of each such employee, his correct labor classification, rate of pay, daily and weekly number of hours worked, any deductions made, and actual basic hourly and fringe benefits paid. The contractor shall submit payroll records each week, and no later than seven (7) working days following completion of the workweek being processed, to the Labor Compliance Office, City of San Antonio. These payroll records shall include certified copies of all payrolls of the contractor and of his subcontractors, it being understood that the contractor shall be responsible for the submission and general mathematical accuracy of payrolls from all his subcontractors. Each such payroll submittal shall be on forms deemed satisfactory to the City's Labor Compliance Office and shall contain a "Weekly Statement of Compliance", as called for by the contract documents. Such payrolls will be forwarded to Capital Improvements Management Services, Labor Compliance Office, City of San Antonio, P.O. Box 839966, San Antonio, Texas 78283-3966.

b. All City of San Antonio construction contracts are subject to contract compliance tracking, and the prime contractor and any subcontractors are required to provide any stated and/or requested contract compliance-related data electronically in the Labor Compliance Electronic Certified Payrolls System. The prime contractor and all subcontractors are required to respond not later than the stated response date or due date to any instructions or

request for information from the Labor Compliance Office. All prime contractors and subcontractors shall periodically review the City of San Antonio labor Compliance Electronic Certified Payrolls System to manage contact information and the contract records. The prime contractor shall ensure that all subcontractors have completed all requested forms and that all contact information is accurate and up-to-date. The City of San Antonio Labor Compliance Office may require additional information related to the contract to be provided through the San Antonio Labor Compliance Electronic Certified Payrolls System at any time before, during, or after contract award.

c. A designated point of contact for contractor access to the San Antonio Labor Compliance Electronic Certified Payrolls System shall be provided for each prime contractor upon award of the contract.

d. Copies of payroll submittals and basic supporting payroll records of the contractor/subcontractors accounting for all laborers/mechanics employed under the work covered by this contract shall be maintained during the course of the work and preserved for a period of three (3) years after completion of the project. The contractors/subcontractors shall maintain records which demonstrate: any contractor commitment to provide fringe benefits to employees as may be mandated by the applicable wage determination decision, that the plan or program is adjudged financially responsible by the appropriate approving authority, (i.e. U. S. Department of Labor, U.S. Department of Treasury, etc.), and that the provisions, policies, certificates, and description of benefits of the plan or program as may be periodically amended, have been clearly communicated in a timely manner and in writing, to the laborers/mechanics affected prior to their performing work on the project.

e. The contractor/subcontractor shall make the above records available for inspection, copying, or transcribing by authorized representatives of the City of San Antonio at reasonable times and locations for purposes of monitoring compliance with this contract.

f. All certified payrolls submitted to the Labor Compliance Office are deemed true and accurate. If upon review of the certified payrolls, wage underpayment violations are identified and noted, restitution will be calculated and penalties will be issued to the prime contractor of the project. In order to refute a wage violation, the contractor/subcontractor must provide supporting documentation to the Labor Compliance Office for review and consideration.

13. LABOR DISPUTES

The contractor/subcontractor shall immediately notify the Project Management Office or designated representative of any actual or impending contractor/subcontractor labor dispute

which may affect, or is affecting, the schedule of the contractor, or any other contractor/subcontractor work. In addition, the contractor/subcontractor shall consider all appropriate measures to eliminate or minimize the effect of such labor disputes on the schedule, including but not limited to such measures as: promptly seeking injunctive relief if appropriate; seeking appropriate legal or equitable actions or remedies; taking such measures as establishing a reserved rate, as appropriate; if reasonably feasible, seeking other sources of supply or service; and any other measures that may be appropriately utilized to mitigate or eliminate the jobsite and scheduling effects of the labor dispute.

14. COMPLAINTS, PROCEEDINGS, OR TESTIMONY BY EMPLOYEES

No laborers/mechanics to whom the wage, salary, or other labor standard provisions of this contract are applicable shall be discharged in any other manner discriminated against by the contractor/subcontractors because such employee has filed any formal inquiry or complaint or instituted, or caused to be instituted, any legal or equitable proceeding or has testified, or is about to testify, in any such preceding under or relating to the wage and labor standards applicable under this contract.

15. EMPLOYEE INTERVIEWS TO ASSURE WAGE AND LABOR STANDARD COMPLIANCE

Contractor/subcontractors shall allow expeditious jobsite entry of City of San Antonio Labor Compliance representatives displaying and presenting proper identification credentials to the jobsite superintendent or his representative. While on the jobsite, the Labor Compliance representatives shall observe all jobsite rules and regulations concerning safety, internal security and fire prevention. Contractor/subcontractors shall allow project employees to be separately and confidentially interviewed at random for a reasonable duration by the Labor Compliance representatives to facilitate compliance determinations regarding adherence by the contractor/subcontractor to these Wage and Labor Standard Provisions.

16. "ANTI-KICKBACK" PROVISION

No person employed in the construction or repair of any City of San Antonio public work shall be induced, by any means, to give up to any contractor/subcontractor or public official or employee any part of the hourly and/or fringe benefit compensation to which he is otherwise entitled.

17. "FALSE OR DECEPTIVE INFORMATION PROVISION"

Any person employed by the contractor/subcontractor in the construction or repair of any City of San Antonio public work, who is proven to have knowingly and willfully falsified, concealed or covered up by any deceptive trick, scheme, or device a material fact, or made any false, fictitious or fraudulent statement or representation, or made or used any

false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry, shall be permanently removed from the jobsite by contractor/subcontractor. The City of San Antonio reserves the right to terminate this contract for cause as a result of serious and uncured violations of this provision.

18. EMPLOYMENT OF APPRENTICES/TRAINEES

a. Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship & Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship & Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen in any craft classification shall not be greater than the ratio permitted to the contractor/subcontractor as to his entire work force under the registered program. Any employee listed on a payroll at an apprentice wage rate, who is not a trainee as defined in (b) below or is not registered or otherwise employed as stated above, shall be paid the wage rate for the classification of work he actually performs. The contractor/subcontractor is required to furnish to the Labor Compliance Office of the City of San Antonio, a copy of the certification, along with the payroll record that the employee is first listed on. The wage rate paid apprentices shall be not less than the specified rate in the registered program for the apprentice's level of progress expressed as the appropriate percentage of the journeyman's rate contained in the applicable wage determination decision.

b. Trainees will be permitted to work at less than the predetermined rate for the work performed when they are employed pursuant to an individually registered program which has received prior approval, evidenced by formal certification by the U. S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen shall not be greater than that permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for his/her level of progress. Any employee listed on the payroll at a trainee wage rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the wage rate determined by the classification of work he actually performs. The contractor/subcontractor is required to furnish a copy of the trainee program certification, registration of employee-trainees, ratios and wage rates

prescribed in the program, along with the payroll record that the employee is first listed on, to the Labor Compliance Office of the City of San Antonio. In the event the Employment and Training Administration withdraws approval of a training program, the contractor/subcontractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved by the Employment and Training Administration.

c. Paragraphs above shall not operate to exclude training programs approved by the OFCCP, United States Department of Labor and as adopted by the Associated General Contractors (AGC) of Texas, Highway, Heavy, Utilities and Industrial Branch. Guidelines for these training programs shall be the same as those established for federally funded projects. This sub-paragraph shall not apply to those portions of a project deemed to be building construction.

d. The Ratio to Apprentice to Journeyman for this project shall be the same as the ratio permitted under the plan approved by the Employment and Training, Administration, Bureau of Apprenticeship and Training, U.S. Department of Labor, by Craft. A copy of the allowable Ratios is included with the applicable Wage Determination Decision in the specifications for this project.

When a "full investigation" (as called for in, and as construed under, Texas Government Code Section 2258) evidences a violation of the Apprentice or Trainee to Journeyman ratios effective for contractor/subcontractor employees working on this contract, the City of San Antonio, in addition to such other rights as may be afforded it under state and/or federal law and/or other sections of this contract, shall withhold from the contractor, out of any payments (interim progress and/or final) due the contractor, the liquidated damages sum of seventy-five dollars ($75.00) for each calendar day, or portion thereof, for each certified Apprentice or Trainee employee assigned to a Journeyman that exceeds the maximum allowable Apprentice/ Trainee to Journeyman ratio stipulated for any work done under this contract, whether by the contractor himself or by any subcontractor working under him.

19. JOBSITE CONDITIONS

Contractors/subcontractors shall not allow any person employed for the project to work in surroundings or under construction conditions which are unsanitary, unhealthy, hazardous, or dangerous as governed by industry standards and appropriate local, state and federal statutes, ordinances, and regulatory guidelines.

20. EMPLOYMENT OF CERTAIN PERSONS PROHIBITED

a. The contractor/subcontractor shall knowingly only employ persons of appropriate ages commensurate with the degree of

required skill, strength, maturity and judgment associated with the activity to be engaged in, but not less than the age of fourteen (14) years, as governed by the Texas Child Labor Law, Chapter 51 of the Texas Labor Code "Child Labor" and Texas Department of Labor and Standards rulings and interpretations associated with that statute. It is hereby noted that in some circumstances generally governed by this section, a federal statute (see: Fair Labor Standards Act, 29 USCS Section 212; Volume 6A of the Bureau of National Affairs Wage Hour Manual at Paragraph 96:1; "Child Labor Requirements in Nonagricultural Occupations" WH Publication 1330, July 1978 as may be amended), could pre-empt the Texas Statute and therefore be the controlling law on this subject. The contractor/subcontractor should seek clarification from state and federal agencies and legal counsel when hiring adolescent employees for particular job classifications.

b. Prohibited persons not to be employed are also those persons who, at the time of employment for this contract, are serving sentence in a penal or correctional institution except that prior approval by the Director of Capital Improvements Management Services is required to employ any person participating in a supervised work release or furlough program that is sanctioned by appropriate state or federal correctional agencies.

c. The Contractor/subcontractors shall be responsible for compliance with the provisions of the "Immigration Reform and Control Act of 1986" Public Law 99-603, and any related State enabling or implementing statutes, especially as they in combination apply to the unlawful employment of aliens and unfair immigration-related employment practices affecting this contract.

21. PROVISIONS TO BE INCLUDED IN SUBCONTRACTS

The contractor shall cause these Wage and Labor Standard Provisions, or reasonably similar contextual adaptations hereof, and any other appropriate state and federal labor provisions, to be inserted in all subcontracts relative to the work to bind subcontractors to the same Wage and Labor Standards as contained in these terms of the General Conditions and other contract documents insofar as applicable to the work of subcontractors or sub-subcontractors and to give the contractor similar, if not greater, general contractual authority over the subcontractor or subcontractors as the City of San Antonio may exercise over the contractor.

22. CONTRACTOR'S RESPONSIBILITY

The prime contractor shall be responsible for ensuring that its subcontractors comply with the Wage and Labor Standards Provisions.

DIVISION B

ADDITIONAL REQUIREMENTS FROM AVIATION DEPARTMENT

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INSURANCE

A) Prior to the commencement of any work under this Agreement, Contractor shall furnish copies of all required endorsements and completed Certificate(s) of Insurance to the City's Risk Management Department, which shall be clearly labeled "*Runway 12R-30L Rehabilitation and Terminal Area Taxiway Improvements (Package 1)*" in the Description of Operations block of the Certificate. The Certificate(s) shall be completed by an agent and signed by a person authorized by that insurer to bind coverage on its behalf. The City will not accept a Memorandum of Insurance or Binder as proof of insurance. The certificate(s) must have the agent's signature and phone number, and be mailed, with copies of all applicable endorsements, directly from the insurer's authorized representative to the City. The City shall have no duty to pay or perform under this Agreement until such certificate and endorsements have been received and approved by the City's Risk Management Department. No officer or employee, other than the City's Risk Manager, shall have authority to waive this requirement.

B) The City reserves the right to review the insurance requirements of this Article during the effective period of this Agreement and any extension or renewal hereof and to modify insurance coverages and their limits when deemed necessary and prudent by City's Risk Manager based upon changes in statutory law, court decisions, or circumstances surrounding this Agreement. In no instance will City allow modification whereby City may incur increased risk.

C) A Contractor's financial integrity is of interest to the City; therefore, subject to Contractor's right to maintain reasonable deductibles in such amounts as are approved by the City, Contractor shall obtain and maintain in full force and effect for the duration of this Agreement, and any extension hereof, at Contractor's sole expense, insurance coverage written on an occurrence basis, unless otherwise indicated, by companies authorized to do business in the State of Texas and with an A.M Best's rating of no less than A- (VII), in the following types and for an amount not less than the amount listed below:

TYPE	AMOUNTS
1. Workers' Compensation 2. Employers' Liability	Statutory $500,000/$500,000/$500,000
3. Broad form Commercial General Liability Insurance to include coverage for the following: a. Premises/Operations b. Independent Contractors c. Products/Completed Operations d. Personal Injury	For Bodily Injury and Property Damage of $5,000,000 per occurrence; $10,000,000 General Aggregate, or its equivalent in Umbrella or Excess Liability Coverage
e. Contractual Liability f. Damage to property rented by you	f. $100,000
4. Business Automobile Liability a. Owned/leased vehicles b. Non-owned vehicles c. Hired Vehicles	Combined Single Limit for Bodily Injury and Property Damage of $5,000,000 per occurrence.

D) Contractor agrees to require, by written contract, that all subcontractors providing goods or services hereunder obtain the same insurance coverages required of Contractor herein, and provide a certificate of insurance and endorsement that names the Contractor and the CITY as additional insureds. Respondent shall provide the CITY with said certificate and endorsement prior to the commencement of any work by the subcontractor. This provision may be modified by City's Risk Manager, without subsequent City Council approval, when deemed necessary and prudent, based upon changes in statutory law, court decisions, or circumstances surrounding this agreement. Such modification may be enacted by letter signed by City's Risk Manager, which shall become a part of the contract for all purposes.

E) As they apply to the limits required by the City, the City shall be entitled, upon request and without expense, to receive copies of the policies, declaration page, and all endorsements thereto and may require the deletion, revision, or modification of particular policy terms, conditions, limitations, or exclusions (except where policy provisions are established by law or regulation binding upon either of the parties hereto or the underwriter of any such policies). Contractor shall be required to comply with any such requests and shall submit a copy of the replacement certificate of insurance to City at the address provided below within 10 days of the requested change. Contractor shall pay any costs incurred resulting from said changes.

City of San Antonio
Attn: Risk Management Department
P.O. Box 839966
San Antonio, Texas 78283-3966

F) Contractor agrees that with respect to the above required insurance, all insurance policies are to contain or be endorsed to contain the following provisions:

- Name the City, its officers, officials, employees, volunteers, and elected representatives as additional insureds by endorsement, as respects operations and activities of, or on behalf of, the named insured performed under contract with the City, with the exception of the workers' compensation and professional liability policies;
- Provide for an endorsement that the "other insurance" clause shall not apply to the City of San Antonio where the City is an additional insured shown on the policy;
- Workers' compensation, employers' liability, general liability and automobile liability policies will provide a waiver of subrogation in favor of the City.
- Provide advance written notice directly to City of any suspension, cancellation, non-renewal or material change in coverage, and not less than ten (10) calendar days advance notice for nonpayment of premium.

G) Within five (5) calendar days of a suspension, cancellation or non-renewal of coverage, Contractor shall provide a replacement Certificate of Insurance and applicable endorsements to City. City shall have the option to suspend Contractor's performance should there be a lapse in coverage at any time during this contract. Failure to provide and to maintain the required insurance shall constitute a material breach of this Agreement.

H) In addition to any other remedies the City may have upon Contractor's failure to provide and maintain any insurance or policy endorsements to the extent and within the time herein required,

the City shall have the right to order Contractor to stop work hereunder, and/or withhold any payment(s) which become due to Contractor hereunder until Contractor demonstrates compliance with the requirements hereof.

I) Nothing herein contained shall be construed as limiting in any way the extent to which Contractor may be held responsible for payments of damages to persons or property resulting from Contractor's or its subcontractors' performance of the work covered under this Agreement.

J) It is agreed that Contractor's insurance shall be deemed primary and non- contributory with respect to any insurance or self-insurance carried by the City of San Antonio for liability arising out of operations under this Agreement.

K) It is understood and agreed that the insurance required is in addition to and separate from any other obligation contained in this Agreement and that no claim or action by or on behalf of the City shall be limited to insurance coverage provided..

L) Contractor and any Subcontractors are responsible for all damage to their own equipment and/or property.

Workers' Compensation Insurance Coverage.

(a) Definitions:

(1) Certificate of coverage ("certificate")- A copy of a certificate of insurance, a certificate of authority to self-insure issued by the Division, or a coverage agreement (DWC-81, DWC-82, DWC-83, or DWC-84), showing statutory workers' compensation insurance coverage for the person's or entity's employees providing services on a project, for the duration of the project.

(2) Duration of the project - includes the time from the beginning of the work on the project until the contractor's/person's work on the project has been completed and accepted by the City.

(3) Persons providing services on the project ("subcontractor" in §406.096) - includes all persons or entities performing all or part of the services the contractor has undertaken to perform on the project, regardless of whether that person contracted directly with the contractor and regardless of whether that person has employees. This includes, without limitation, independent contractors, subcontractors, leasing companies, motor carriers, owner-operators, employees of any such entity, or employees of any entity which furnishes persons to provide services on the project. "Services" include, without limitation, providing, hauling, or delivering equipment or materials, or providing labor, transportation, or other service related to a project. "Services" does not include activities unrelated to the project, such as food/beverage vendors, office supply deliveries, and delivery of portable toilets.

(b) The contractor shall provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all employees of the contractor providing services on the project, for the duration of the project.

(c) The contractor must provide a certificate of coverage to the City prior to being awarded the contract.

(d) If the coverage period shown on the contractor's current certificate of coverage ends during the duration of the project, the contractor must, prior to the end of the coverage period, file a new certificate of coverage with the City showing that coverage has been extended.

(e) The contractor shall obtain from each person providing services on a project, and provide to the City:

(1) a certificate of coverage, prior to that person beginning work on the project, so the City will have on file certificates of coverage showing coverage for all persons providing services on the project; and

(2) no later than seven days after receipt by the contractor, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project.

(f) The contractor shall retain all required certificates of coverage for the duration of the project and for one year thereafter.

(g) The contractor shall notify the City in writing by certified mail or personal delivery, within 10 days after the contractor knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project.

(h) The contractor shall post on each project site a notice, in the text, form and manner prescribed by the Texas Workers' Compensation Division, informing all persons providing services on the project that they are required to be covered, and stating how a person may verify coverage and report lack of coverage.

(i) The contractor shall contractually require each person with whom it contracts to provide services on a project, to:

(1) provide coverage, based on proper reporting of classification codes and payroll amounts and filing of any coverage agreements, which meets the statutory requirements of Texas Labor Code, Section 401.011(44) for all of its employees providing services on the project, for the duration of the project;

(2) provide to the contractor, prior to that person beginning work on the project, a certificate of coverage showing that coverage is being provided for all employees of the person providing services on the project, for the duration of the project;

(3) provide the contractor, prior to the end of the coverage period, a new certificate of coverage showing extension of coverage, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(4) obtain from each other person with whom it contracts, and provide to the contractor:

(i) a certificate of coverage, prior to the other person beginning work on the project; and

(ii) a new certificate of coverage showing extension of coverage, prior to the end of the coverage period, if the coverage period shown on the current certificate of coverage ends during the duration of the project;

(5) retain all required certificates of coverage on file for the duration of the project and for one year thereafter;

(6) notify the City in writing by certified mail or personal delivery, within 10 days after the person knew or should have known, of any change that materially affects the provision of coverage of any person providing services on the project; and

(7) Contractually require each person with whom it contracts, to perform as required by paragraphs (1) - (7), with the certificates of coverage to be provided to the person for whom they are providing services.

(j) By signing this contract or providing or causing to be provided a certificate of coverage, the contractor is representing to the City that all employees of the contractor who will provide services on the project will be covered by workers' compensation coverage for the duration of the project, that the coverage will be based on proper reporting of classification codes and payroll amounts, and that all coverage agreements will be filed with the appropriate insurance carrier or, in the case of a self-insured, with the Division's section of Self-Insurance Regulation. Providing false or misleading information may subject the contractor to administrative penalties, criminal penalties, civil penalties, or other civil actions.

(k) The contractor's failure to comply with any of these provisions is a breach of contract by the contractor which entitles the City to declare the contract void if the contractor does not remedy the breach within ten days after receipt of notice of breach from the City.

END OF INSURANCE

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SUPPLEMENT TO STANDARD INSTRUCTIONS TO RESPONDENTS

1. Project Description:

This project consists of construction work at San Antonio International Airport, San Antonio, Texas. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor furnish all labor, materials, equipment, tools, transportation and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

The Contractor shall provide unit prices for the base bids and also for all five (5) alternate bids. The description of the base bid and five (5) alternate bids are as follows:

BASE BID

The "Base Bid" consists of the reconstruction of two areas of pavement on Runway 12R-30L. The area of reconstruction on the 12R end of the runway is 325 feet long and 150 feet wide while the area on the 30L end is 425 feet long by 50 feet wide. Both of these locations will require the removal of the existing Portland Cement Concrete (PCC) pavement section including the removal of the Cement Treated Base (CTB). The existing sub-base will be re-compacted and 16 inches of reinforced PCC pavement will be constructed on 12 inches of CTB. In addition to the runway, Taxiway W will be constructed to a point outside of the Runway Safety Area (RSA). This taxiway will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade. This work also includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, drainage pipe and inlet removal and installation, and engineer's field and laboratory office.

ALTERNATE BID NO. 1

Alternate bid number one (1) consists of the reconstruction and expansion of the inner taxilane and stub outs for ultimate connecting taxiways to Taxiway G. The inner Taxilane will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade. This work also includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, drainage pipe and inlet removal and installation, and engineer's field and laboratory office.

ALTERNATE BID NO. 2

Alternate bid number two (2) consists of the reconstruction and expansion of a portion of Taxiway G and

the construction of a new connecting taxiway (G2) to the inner taxilane. This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade. This work also includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, and engineer's field and laboratory office.

ALTERNATE BID NO. 3

Alternate bid number three (3) consists of the reconstruction and expansion of a portion of Taxiway G and the construction of a new connecting taxiway (G1) to the inner taxilane. This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade. This work also includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, and engineer's field and laboratory office.

ALTERNATE BID NO. 4

Alternate bid number four (4) consists of the reconstruction and expansion of a portion of Taxiway G and the construction of a new connecting taxiway (G3) to the inner taxilane. This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade. This work also includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, and engineer's field and laboratory office.

ALTERNATE BID NO. 5

Alternate bid number five (5) consists of the construction of the remaining portion of Taxiway W from the RSA to Taxiway G including the FAA required tapers. Alternate 5 also includes the reconstruction of a portion of Taxiway G, the installation of asphalt paved shoulders along Taxiway G and the construction of a painted island (Taxiway W island). This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade. This work also includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, and engineer's field and laboratory office.

2. A responsive bid shall consist of the following:

   a. Compliance with items set forth in Division A, Formal Invitation for bids (IFB) and Contract

3. In determining a low bidder, the City shall consider the total of the following:

   a. Base Bid, and all Alternative Bids (where applicable)
   b. Contractor's qualifications

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STANDARD INSTRUCTIONS TO BIDDERS FOR FEDERALLY ASSISTED CONTRACTS (SIB-AVIATION)

1. DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

1.1 It is the policy of the City of San Antonio to involve qualified Small, Minority, African-American, Woman-owned, and local business enterprises to the greatest extent feasible in the City's construction, procurement, professional services, and leases and concessions contracting. Per Ordinance #69403, the City of San Antonio, its employees, contractors, and subcontractors shall not discriminate on the basis of race, color, religion, national origin, sex, age, or handicap in the award and performance of contracts. Violation of this ordinance is a criminal offense and subject to penalty.

1.2 Requirements for **ALL** bids:

1.2.1. It is the policy of the City of San Antonio that disadvantaged business enterprises (DBEs), as defined under 49 CFR Part 26, shall have "equality of opportunity" to participate in the awarding of federally-assisted Aviation Department contracts and related subcontracts, to include sub-tier subcontracts. This policy supports the position of the U.S. Department of Transportation (DOT) in creating a level playing field and removing barriers by ensuring nondiscrimination in the award and administration of contracts financed in whole or in part with federal funds under this contract. Therefore, on all DOT-assisted projects the DBE program requirements of 49 CFR Part 26 apply to the contract.

1.2.2. The Bidder/Contractor agrees to employ good-faith efforts (as defined in the Aviation Department's DBE Program) to carry out this policy through award of subcontracts to disadvantaged business enterprises to the fullest extent consistent with the sufficient performance of the Aviation Department Contract, and/or the utilization of DBE suppliers where feasible. Aviation Department bidders/contractors are expected to solicit bids from available DBE's on contracts which offer subcontracting opportunities.

1.2.3. Bidder/Contractor specifically agrees to comply with all applicable provisions of the Aviation Department's DBE Program. The DBE Program may be obtained through the airport's DBE Liaison Officer at (210) 207-3505 or by contacting the City's Aviation Department.

1.2.4 Notification is hereby given that a DBE contract specific goal has been established on this bid/contract. The applicable DBE goal is 24.8% of the total dollar value of this contract.

1.2.5. The Contractor shall appoint a high-level official to administer and coordinate the Contractor's efforts to carry out the DBE Policy and Program requisites. The Contractor's official should coordinate and ensure approval of the required "*Good-Faith Effort Plan*" (Attachment 1).

1.2.6. The Contractor shall maintain records, as specified in the audit and records section of the contract, showing: (i) all subcontract/supplier awards, specifically awards to DBE firms; (ii) specific efforts to identify and award such contracts to DBEs; and (iii) submit when requested, copies of executed contracts to establish actual DBE participation.

1.2.7 The Contractor shall agree to submit periodic reports of subcontract and/or supplier awards to DBE firms in such form and manner and at such times as the Aviation Department shall prescribe and shall provide access to books, records, and accounts to authorized officials of the City, Aviation Department, state, and/or federal agencies for the purpose of verifying DBE participation and good-faith efforts to carry out the DBE Policy and Program. All Aviation Department contractors may be subject to a post contract DBE audit. Audit determination(s) may be considered and have a bearing in the evaluation of a Contractor's good-faith efforts on future airport contracts.

1.2.8 All construction Bidders/Contractors with contracts subject to formal review and approval shall make good-faith efforts (as defined and approved by the City through the Aviation Department in its DBE Program) to subcontract and achieve the applicable contract specific DBE goal with certified DBEs. Contractors failing to achieve the applicable contract specific DBE goal or contractors failing to maintain the specific DBE goal percentage involvement initially achieved, will be required to provide documentation demonstrating that they have made good-faith efforts in attempting to do so through the submittal of an Aviation Department approved "*DBE Good-Faith Effort Plan*". *Bidders are required to satisfy applicable DBE program requirements prior to the award of the Aviation Department contract.* Bidders must submit a *DBE Good-Faith Effort Plan* or will be considered non-responsive.

1.2.9 A Bidder/Contractor may count towards its DBE goal sixty percent (60%) of its expenditures for materials and supplies required under a contract and obtained from a regular dealer, and one hundred percent (100%) of such expenditures to a DBE manufacturer. For purposes of this section, a manufacturer is a firm that operates or maintains a factory or establishment that produces on the premises the materials or supplies obtained by the Bidder or Contractor.

1.2.10. The City and Aviation Department encourages the Bidder/Contractor to utilize currently approved and certified DBE firms on the contract for DBE goal achievement and credit purposes. The Aviation Department utilizes the services of the South Central Texas Regional Certification Agency (SCTRCA) to certify DBE eligibility status. Please contact the SCTRCA at 305 E. Euclid, Suite 102, San Antonio, Texas 78212 (210/227-4722) for information regarding DBE trade areas or to apply for DBE status. The Aviation Department accepts DBE certification from any one of the five (5) certifying agencies under the Texas Unified Certification Program (TUCP) – Texas Department of Transportation (TxDOT), North Central Texas Regional Certification Agency (NCTRCA), South Central Texas Regional Certification Agency (SCTRCA), City of Houston, and the Corpus Christi Regional Transportation Authority.

1.2.11. Submittal of DBE status certification information for **all** DBE firms utilized or proposed to be utilized on the project as subcontractors, sub-consultants, or vendors, to include prime contractors when applicable, in the performance of work on said project. Additionally, prime contractors must submit a "Letter of Intent" form (Attachment 2) for **each** subcontractorprior to award of contract.

1.2.12. The following DBE-related contractual clause shall be applicable and is specifically included as part of the construction contract. Contractors shall also include this clause in each subcontract the prime contractor signs with a subcontractor.

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

Additionally, Contractors agree to the following prompt payment and retainage payment clause:

“The Prime Contractor agrees to pay each subcontractor under this Prime Contract for satisfactory performance of its Contract no later than thirty (30) days from the receipt of each payment the Prime Contractor receives from the City of San Antonio. The Prime Contractor further agrees to return retainage payments to each subcontractor within thirty (30) days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced timeframe may occur only for good cause following written approval from the City of San Antonio. This Clause applies to both DBE and non-DBE subcontractors".

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Additional Supplemental General Conditions Required For Aviation Department Projects

1) The use of explosives is strictly prohibited on airports.

2) The Contractor will be responsible for construction staking except for verifying and making benchmarks for horizontal and vertical control.

3) Survey Layout:

The Contractor shall employ an experienced and competent surveyor, registered in the State of Texas, to lay out the detail lines and grades of the work from the horizontal and vertical control established in those contract documents. A closed traverse and level loop within a close proximity of the construction will be provided by the surveyor to the Contractor. A copy of such work will be presented to the Architect/Engineer for review prior to any field layout by the Contractor.

4) This contract shall be a calendar day contract.

5) Extension of Time for Adverse Weather:

Extension of time for adverse weather conditions not reasonably anticipated as provided in Subparagraph 8.3.1 will be granted for those days where precipitation is 0.10 inch or greater and where the number of such days exceed the normal number of rain days in that particular month. This provision shall cease at the time of Substantial Completion. The determination of the normal number of rain days per month shall be according to Local Climatological Data prepared by the National Oceanic and Atmospheric Administration.

For the San Antonio area, the climatological data is recorded at the airport weather station. The Contractor may expect adverse weather for the number of calendar days in accordance with the following local climatological data prepared by NOAA.

0.10 In. or More
Precipitation at
San Antonio Airport

January	2
February	4
March	2
April	4
May	4
June	3
July	3
August	3
September	5
October	6
November	3
December	3
Total Days Lost	42

The contractor agrees that the measure of adverse weather during the period covered by the Specification shall be the number of days in excess of those shown for each month.

6) Aviation Department may close the construction site due to security reasons. The contractor will not be compensated for any loss due to shut down for the first three closures. Each day shall be counted as one shut down regardless of the total hours involved for each day.

7) Contractor shall provide, prepare and distribute agendas and minutes for all construction progress meetings and/or coordination meetings.

8) As per FAA policy, the prime contractor must provide the Aviation Department a Buy American Preference certificate.

9) Staging Area and Storage Area:

A) The contractor needs to maintain areas in a clean and neat condition.

B) If the contractor and/or their subcontractors store equipment, fuel, paint, or other hazardous material at the staging areas, and/or storage areas, the contractor will perform and pay the costs for soil and water testing before use of the site, upon exit from the site and any site remediation that may be necessary, as directed by the owner.

C) Prior to occupying and upon vacating any staging areas and/or storage areas, the contractor shall submit to the owner a minimum of 10 photographs documenting the initial and final conditions of the staging areas and/or storage areas. Each photograph must have a date. During the construction, the contractor needs to provide 5 progress photographs for each area with each payment request.

D) The contractor shall provide two weeks written notice to the owner prior to vacating the staging areas and/or storage areas.

E) The policies stated here will be applied to the areas owned by the private citizens and leased by the contractor for the project involved.

10) Reflective Safety Vests:
All construction personnel or site visitors on the Airport Operations Area (AOA) must wear a reflective safety vest at all times. All reflective safety vests must at a minimum meet ANSI Class-2, Level-2 standards.

SPECIAL CONDITIONS FOR CONSTRUCTION WITHIN THE AIR OPERATIONS AREA AT SAN ANTONIO INTERNATIONAL AIRPORT

San Antonio International Airport maintains operations 24 hours a day, 365 days per year for General Aviation and Air Carrier Service. Safety, Security and Operations will take precedence over all construction activities within the Airport Property. As such, all construction activity shall be conducted in accordance with the stipulations outlined below:

SECURITY

FINES

Any fines assessed to the Aviation Department due to the contractor's violations of any security requirements will be passed on to the contractor.

BADGING

Personnel working within the AOA must display current Airport issued identification at all times. The contractor shall be responsible for providing the necessary background checks for these personnel as well as maintaining personnel files for the project duration. These files are subject to FAA, TSA and Airport Police review. Subsequent to the pre-construction meeting, the contractor must arrange for all badged personnel to attend the SIDA class. Not all personnel must be badged.

It is permissible to have one (1) red-badge (with "E") personnel to escort and be responsible for up to two (2) unbadged persons. All unescorted equipment operators and drivers must be badged. SIDA classes are coordinated through Airport Police and take approximately two (2) hours. All badges remain the property of the Aviation Department and must be returned at the completion of the contract.

CONSTRUCTION ACCESS

The contractor will be issued ingress/egress into the AOA at a point designated by the Aviation Department, Airport Police. This point will be as close and practicable to the marshalling area as possible. The contractor will be required to enter into a security amendment, which shall be issued and kept, on file with Airport Police. It will be the contractor's responsibility to maintain security at all times during the duration of the contract. The access will be locked at all times while unattended and shall be manned by approved badged personnel only. It includes the access to the borrow site, the batch plant site, the storage site and/or the fill area.

OPERATIONS

Aviation Department, Planning and Development Section (P&D) is charged with the responsibility of overseeing construction projects within the airport property, including the proper execution of all facets of the construction activities and compliance with applicable Federal Regulations. The Aviation Operations Section is responsible for the safety and efficiency of the airport operation through daily operation management. The contractor shall comply with all directives issued by Aviation P&D and Operations Section in a timely manner.

VEHICULAR OPERATIONS

Not all badged personnel need to have an airfield driver license. If the badge personnel need to drive in the airport operations area (AOA), he/she must attend the required driving course sponsored by Airport Operations and takes approximately four (4) hours to complete. No vehicles may be operated within the Air Operations Area (AOA) until the drivers successfully pass the driving course and satisfactory Insurance Certificates are on file with the office of Planning & Development. Upon course completion, the individual will be required to demonstrate knowledge of rules, regulations, and procedures governing their behavior while in movement area via written and practical examinations.

All vehicular movement areas used by the contractor will be subject to the approval of the Aviation Department. All airfield drivers who are found in violation of the Airfield Driver's Training guidelines or the Airport Rules and Regulations will be issued a written citation and will be subject to possible revocation and termination of AOA driving privileges.

All construction vehicles/mechanized equipment operating on Airport property needs to have a 12" company logos or 6" letters identifying the company, displayed on both doors. All construction vehicles and mechanized equipment authorized within the airfield Movement area, ramps or related safety areas shall also need to have one FAA approved flag located on the uppermost portion of the vehicle/ mechanized equipment or is escorted by a vehicle so equipped. The FAA approved flag is a 3'*3' orange and white checkered flag with each box being 1' square.

During the periods of low visibility or evening, the contractor shall follow Advisory Circular 150/5210-5D, Painting, Marking, and Lighting of Vehicles Used on an Airport to provide identification lighting devices on vehicles and construction equipment while working in the airport operations area (AOA).

During the night time hours, all equipment operating on the airport exceeding 15 feet in height shall be lit with a red obstruction light in accordance with Advisory Circular 70/7460-1K, Obstruction Marking and Lighting. The light is to be located on the uppermost portion of the equipment.

ESCORT

Any vehicle operated by personnel authorized to drive and to escort (red-badge with "E") within the AOA can only escort two vehicles and equipment being operated by personnel without having successfully completed the driving course. The escorted vehicles must be behind and proximate to the vehicle at all times while within the AOA including departing through the construction access. All escorted vehicles must have a 12" company logo each on the driver door and passenger door. Should the need arise to enter or cross an active runway, the escort must be done by personnel from Airport Operations and coordinated through Airport Operations.

BARRICADES

All construction areas shall be properly barricaded, signed and marked as directed by the Aviation Department in accordance with the barricade markings shown on the drawings. Barricades shall be properly secured as necessary to prevent overturning or displacement from wind or jet blast and shall be illuminated. Refer to FAA Advisory Circular 150/5340-1K "Standards for Airport Markings" for FAA lighting and marking standards on airport runways, taxiways and aprons and FAA AC 150/5370-2F "Operational Safety on Airports during Construction" for aviation safety during construction. Excavated areas shall not be left unattended unless appropriate barricades are provided. The contractor shall have a designated contact person with a telephone number on file with the Airport Operations who shall be on call 24 hours a day in order to maintain the barricades. Location and placement shall be adjusted as necessitated by changes in construction progress.

Safety netting shall be installed in locations as shown on the drawings or as directed by the Resident Engineer on the field. Netting shall be installed prior to the start of construction and shall be maintained for the duration of the project. Adjustments in location shall be made as directed by the Aviation Department.

Should the contractor fail to maintain barricades, barriers, signage and/or erosion control devices and Aviation Department Personnel are required to perform corrective action, the contractor will be charged for this service.

COMMUNICATION:

In order to maintain constant communication with the air traffic control tower, the contractor shall furnish and maintain in good operating condition, at least one two-way portable VHF radio having a frequency of 121.9 MHZ to aid in the control of vehicles on the airfield.

Operators of any radio equipped vehicles on Movement areas must be trained and familiar with airport radio procedures prior to operating on movement and safety areas.

Vehicle operators must obtain ATCT clearance before entering/operating on Movement area. If working in the Movement area and runways/taxiways safety areas, the contractor must continuously monitor radio. Vehicles, equipment and pedestrians will not be allowed into any taxiway/runway safety area while aircraft operations are being conducted.

ACCIDENT REPORT:

Contractor must immediately report in writing to the Airport Communication Center (207-3433) for all accidents in connection with the performance of work, whether on or adjacent to the site. He also needs to send a copy of the report to SAIA Planning and Development Division.

STORAGE & MARSHALLING AREAS

EXCESS MATERIAL

All material removed from the construction site, which is not to be used in the final construction shall be removed from the Airport Property and disposed of in a legal manner. No excess material shall be disposed of on Airport Property unless prior written approval from the Aviation Department is issued.

CONSTRUCTION MATERIALS

Construction materials not for immediate use shall be stockpiled at the Designated Marshalling Area. Other materials may be stored at approved locations proximate to the work area provided however that the piles are no greater than 18" in height. Higher piles may be permitted only during working hours and in such quantity that they may be reduced in height to 18" maximum within thirty (30) minutes of notification.

EQUIPMENT

All equipment shall be stored at the designated storage areas during non-working times. The Aviation Department may grant special provisions for equipment, which is not readily movable to store elsewhere upon approval.

NAVIGATIONAL EQUIPMENT

TESTING

The FAA maintains various forms of navigational equipment and appurtenances throughout the airport. There may be times during construction where tests and/or equipment checks must be run to maintain serviceability. The contractor shall comply with all requests and directives during the prosecution of the tests. Timely notification of such tests cannot be guaranteed.

CABLES

The Aviation Department and the FAA communication cables, navigational cables, monitor cables and power cables traverse the construction area. Every effort has been made to identify and properly depict the locations of all cables on the drawings. It is the contractor's responsibility to contact the Aviation Department at 207-3519, one week in advance of any construction in order for the cables within the construction area to be properly located and identified by Aviation Dept. and FAA San Antonio office.

The contractor shall identify the location and alignment of these cables along and throughout the entire project area using orange safety netting. Gaps to facilitate vehicular crossings will be permitted as required. These crossings shall be protected using 1½" thick by 8' long steel plates placed along the full width of each crossing. No construction shall commence prior to identifying the cables and placing the required steel plates.

Should the contractor encounter cables not identified on the drawings or field located or cut or otherwise damage any cable, he shall immediately cease operation in the area and notify the Aviation Department at 207-3519, in order for the FAA to identify the cable.

Unless directed otherwise, cut or damaged cables shall be replaced between the existing pull boxes (typically 2,000' (ft.) apart). An FAA certified splicer shall perform all splicing. After all splices are completed, the cables shall be tested for continuity and meggered by the contractor.

Installation of FAA underground cables to be done in accordance with FAA-C-1391b, Installation and Splicing of Underground Cables.

LIGHTING SYSTEMS

The Aviation Department and the FAA maintain the various forms of lighting systems throughout the airport. All portions of these systems shall be properly located and identified prior to the start of construction. The contractor is to contact the Aviation Department at 207-3519, one week in advance of any construction in order that these systems may be properly identified. All electrical work shall be coordinated through the Aviation Department to insure circuit outages are avoided and that the appropriate circuits are properly tagged out. Where directed, the contractor shall provide the necessary safety netting and vehicular crossings as outlined in the section entitled **Cables**.

Any circuit damaged by the contractor shall be repaired at the sole expense of the contractor. Splices will not be allowed. All repairs shall be made from existing splice to existing splice complete with new conduit. Should the contractor have no electricians available to complete the repair, the Aviation Department electricians will complete the repairs and the contractor will be charged for this service.

All labor, materials, tools, cables and connectors necessary to provide temporary circuits as required shall be provided by the contractor.

May 27, 2009

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MEMORANDUM

TO: San Antonio International Airport Stakeholders

FROM: Ryan E. Rocha, Airport Operations Manager

CC: Tim O'Krongley, Assistant Aviation Director, File

RE: **Airfield Driver's Training Program Fees**

DATE: April 22, 2009

In an effort to improve our Airfield Driver's Training program and to offset costs, the Airport Operations Division has been charging fees for the Airfield Driver's Training classes (Non-Movement & Movement) as well as for replacement licenses as of October 1, 2008.

Fees can be paid at the Airport Operations Office beginning May 1, 2009. Tenants and companies who prefer to maintain an account for automatic deductions can do so with the Personnel Identification Office – Airport Police.

It is the sole responsibility of the tenant and/or company to select the correct training course needed for each employee. Airport Operations will schedule the employee to the course selected for the tenant and/or companies.

Payment for services is required **BEFORE** services are rendered. Acceptable forms of payment will include cash (**exact change only**), company check (for **exact amount of participants**), money order or credit card. The Personnel Identification Office – Airport Police will process all credit card payments until further notice. There will only be a partial refund of $5.00 for replacement licenses if the license is found within 30 days of the date on the receipt.

The employee will be required to present their receipt of payment for the course to the instructor prior to the start of class. ***No one will be permitted to attend the course without proof of payment.***

Non Movement – Aprons and parking areas in the Airport Operations Area (AOA). No ATCT clearance is required in these areas.

Movement w/ Restrictions - Taxiways as well as other areas of an airport that are used for taxiing aircraft & parking areas. ATCT clearance is required.

Course		Amount
Non-Movement		
Monday	**1:00 p.m.**	**$15.00**
Tuesday	**9:00 a.m.**	**$15.00**
Friday	**9:00 a.m.**	**$15.00**
Movement w/Restrictions		
Thursdays	**9:00 a.m.**	**$20.00**
Replacement License		**$10.00**

All the courses start exactly at their designated times. No classes will be disrupted after it has started. **NO EXCEPTIONS**. All employees attending the driving course will be required to have their current state driver's license & security (SIDA) badge. Employees with an expired drivers license or security (SIDA) badge will not be permitted to attend the course. Please note that access by vehicles outside their leasehold area to the Airfield Operations Area (AOA) is granted on an as needed basis and adequate insurance is required before the issuance of a license. For more information on insurance coverage please contact us at 210-207-3475.

Your cooperation and support of the Airfield Driver's Training Program and the Airport Operations Division is greatly appreciated.

CITY OF SAN ANTONIO

SAN ANTONIO
DEPARTMENT OF AVIATION

CRANE AND/OR TEMPORARY CONSTRUCTION EQUIPMENT PROCEDURES IN AND AROUND AIRPORTS BUILDING PERMIT FORM

Permit No. _____

Crane Co.: _____

Max Tip Height: _____

Duration of Crane: _____

Hours of Operation: _____

Address: _____

Crane Co. Signature (Print and Sign):

_____

The purpose of the Airport Zoning ordinance is to prevent hazards to air navigation and airspace so as to protect the lives and property within the limits of San Antonio and the vicinity of airports (San Antonio International and Stinson Municipal Airports, Randolph and Lackland Air Force Bases, and Martindale and Camp Bullis Airfields). The ordinance is to prevent cranes and construction equipment from penetrating; however briefly, the City's airspace unless a special temporary authorization is obtained from the Aviation Department or the FAA. The primary considerations, before approving a crane or temporary construction equipment are the height and location/site of the equipment. The Aviation Department will decide to either approve the request or to involve the FAA based on the height and location of the equipment. The FAA's processing time is at least 60 workdays.

When using a crane or temporary construction equipment, please comply with the following:

1. Notify the Aviation Department as soon as it is decided obstruction equipment is needed for the project, but minimally 48 hours before the actual work starts. Phone numbers are 210-207-3514 and/or cell phone 210-355-2214.
2. Provide a detailed description of where the crane will be used. Use crossing or intersecting streets not an address.
3. Provide the date the equipment will be used, the hours of operation and the maximum height of the equipment.

Once approval is given, it is imperative to comply with the following:

1. The equipment will only operate during daylight hours.
2. The equipment will only operate during Visual Flight Rules (VFR) conditions, which is 3 mile visibility or greater.
3. The equipment will be lowered to the surrounding height when not in use.
4. The equipment will be obstruction flagged.

Thank you for maintaining a safe environment for the traveling public. If you have any questions please call Jim Wingate at 210-207-3514 or Alan Lopez at 210-207-3897.

E-Mail Address and phone numbers

Federal Aviation Administration – www.faa.gov
Bruce Beard - 817-838-1996, bruce.beard@faa.gov fax: 817-838-1991
Jim Wingate -210-207-3514, james.wingate@sanantonio.gov fax: 210-207-3544
~~Alan Lopez – 210-207-3897, alan.lopez@sanantonio.gov fax: 210-207-3544~~

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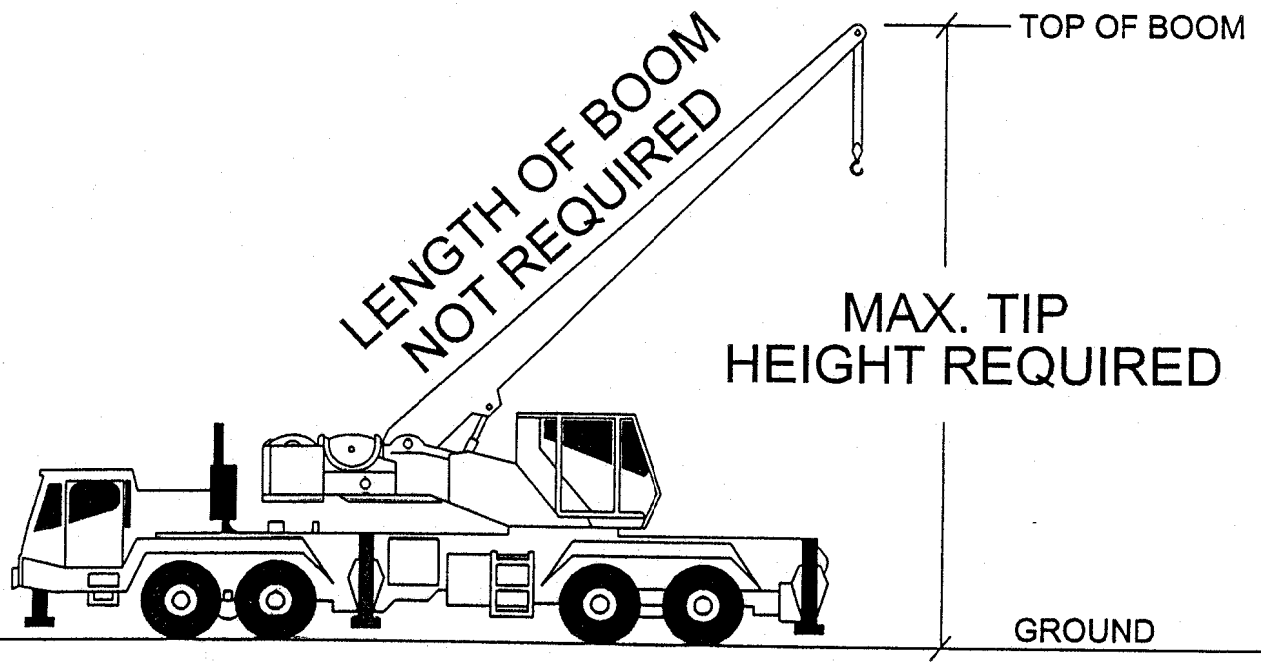

DEFINITION OF CRANE HEIGHT

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FAA Underground Cable Notes:

Location of existing FAA control and communications cables are shown in approximate general locations. The contractor shall coordinate with appropriate representative at least 48 hours in advance prior to commencing excavation in all areas.

If contractor cuts an FAA communications cable, the following will apply:

A. Contractor will be required to replace the cut cable between the existing pull boxes. The average distance between two pull boxes is over 2,000 L.F.

B. All communications cable-splicing must be performed by the contractor utilizing FAA approved and certified splicers. Prior to commencing any splicing activities, an FAA representative shall be contacted to have him/her identify cable strands.

C. After splicing, cables will be tested by the contractor for continuity and for insulation leakage (Hi-Pot test to ground), as directed by the FAA representative.

D. The contractor shall coordinate all matters relating to FAA cables with the project manager and FAA representatives before commencing excavation or repair work.

E. The contractor shall be required to have splice kits located on site. Kits & FAA certified splicer personnel shall be readily available in the event that any communications cables are cut or damaged. All repairs shall be initiated immediately & completed the same day.

F. The driving of heavy equipment or machinery across existing underground cable shall be restricted to designated crossings only. All underground cable crossings shall be protected with ½" * 10' * 4' steel plates. No costs will be charged to the City. All steel plates must be removed by the contractor after the work is completed and return the field to the previous condition or better.

G. Installation of FAA underground cables to be done in accordance with FAA-C-1391b, Installation and Splicing of Underground Cables.

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Safety Notes:

1) The contractor shall remain clear of all taxiways, runways, taxilanes, safety areas, non-movement areas and the tenant areas at all times.

2) All contaminated soil must be transported to the designated soil staging facility temporarily. If the contractor contaminates the site, the contractor must notify the City of San Antonio Aviation Department at 207-3506. The contractor must also clean the affected area at their own expense.

3) Any additional costs, and/or fines, charged to the City of San Antonio Aviation Department due to contractor error, or violations will be passed on to the contractor for payment.

4) The contractor shall provide a uniformed and licensed security guard with adequate airport badge, acceptable to the owner and a functioning telephone at the AOA gate at all times while the gate is unlocked. All personnel and vehicles requiring access to the airfield (AOA) shall comply with all requirements of the airport police.

5) If the project is in or next to any taxiway, taxilane or runway, the contractor must have a mobile VHF radio with ATC ground control frequency 121.9 to aid in the control of vehicles on the airfield.

6) All vehicles and/or equipment operating inside Air Operations Area (AOA) must be provided with an FAA approved flag on a staff and attached to the vehicle so that the flag will be readily visible. The flag shall not be less than three feet square consisting of Aviation Orange and white squares of not less than a foot of each side.

5/27/2009

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ATTACHMENT A

PROCEDURES FOR OBTAINING AIRPORT PERSONNEL IDENTIFICATION BADGE AND AIRFIELD DRIVER'S LICENSE AT SAN ANTONIO INTERNATIONAL AIRPORT (SAT)

As per Transportation Security Administration (TSA) guidelines, a person performing work in the Security Identification Display Area (SIDA), Secured Area, Sterile Area or Airport Operations Area must have a valid Personnel Identification Badge (known as a SAT badge) or be under an airport approved escort by a person having a SAT badge with the white "E" (escort endorsement) on the badge. Each badge holder with the white "E" may escort up to two (2) unbadged individuals while keeping same under positive control at all times while in the SIDA, Secured Area, Sterile Area and/or the project site. **Note:** If the person is disqualified from receiving a SAT badge during the badge application process, or becomes disqualified after receiving a SAT badge, the individual can no longer be present anywhere within the SIDA, Secured Area, Sterile area and/or the project areas. Furthermore, any contractor assigned to the project who has a business related need to be present within the SIDA, Secured Area or Sterile Area for more than 14 days (consecutive or intermittently) must be processed for a SAT badge.

If driving is involved, the person must have a valid SAT badge and the appropriate airfield driver's license to operate a vehicle in the SIDA and/or the project site. If a vehicle escort is required, each SAT badge holder with the white "E" on his badge (and the appropriate airfield driver's license) may escort up to two (2) vehicles if there is only one unbadged person in each vehicle being escorted.

All vehicles operating in the SIDA or the project area must have the appropriate airport approved company signage on the vehicle. The signage must meet the following requirements: Company name must be in at least six inch (6") tall lettering and/or the company logo must be at least twelve inches (12") tall. The signage must be placed on both vertical sides of any self propelled, motorized vehicle at all times while within the SIDA or the project site. If signage is not available, an Airport issued "Top Hat" may be used for vehicles under an airport approved vehicle escort or while parked in the SIDA. A Top Hat may be obtained at SIDA vehicle gate #20. Top Hats must be returned to gate #20 at the end of each work day.

The procedures to obtain an Airport Personnel Identification Badge and/or an airport driver's license are as follows:

A) Airport Personnel Identification Badge (SAT ID Badge):

1) The Airport Security Personnel Identification Office (AS PIO) is located at 9623 West Terminal Drive, Bldg. #1322.

2) Once an Aviation Department division has notified the AS PIO of an approved City contract which will require the badging of personnel, the Contactor's designated representative for badging must call (210) 207-3435 to schedule an appointment with the AS PIO to make arrangements to become an Authorizing Signatory for all SAT badges to be issued to the Contractor's employees working on the contract. Once the Authorizing Signatory has completed the required procedures, i.e., fingerprint-based Criminal History Records Check (CHRC), Security Threat Assessment (STA) background check, SIDA training, Authorizing Signatory training, etc., to receive a SAT badge, the person will then be authorized to approve applications for other Contractor employees under their responsibility. **Note:** If an employee of the Contractor has been convicted of any of the offenses listed in Exhibit 1 hereto, that employee will be immediately disqualified from obtaining a SAT badge and will be ineligible to perform work at SAT

3) All SAT ID badge applications are processed electronically via an online appli**cation** process. Once the Contractor's Authorizing Signatory has been trained successfully on their responsibilities and completed all phases of the badging process, the website address for Contractor's employees to use to complete the application will be provided. Furthermore, the Authorizing Signatory will be provided instructions on how to setup, use and approve badge applications via the online badging system.

4) As of October 1, 2010 badge processing fees are:

Airport Security Badge & ID Office Service	Amount
Fingerprint-based Criminal History Records Check (CHRC)/STA	65.00
Identification Badge (new/renewal/replacement/exchange)	35.00
Non-Returned Identification Badge	75.00
Reactivation of Identification Badge (Security Violation)	
1st Offense	25.00
2nd Offense	50.00
3rd Offense	75.00
Progressive Security Fee Program	Sliding Scale
AOA Parking Decal (for General Aviation leasehold only)	5.00

There is no refund for badge processing fees.

5) As part of the badging process, all Contractor employees are required to complete a computer-based SIDA training class. All documents necessary to complete the application process, including obtaining the applicant's fingerprints to conduct a CHRC, must be completed before the Contractor's employees may attend the computer-based SIDA training class. The class is held on a first come, first served basis and is generally available during the following days/times: Monday – Thursday, 8:00 a.m. – 3:00 p.m., and Friday, 8:00 a.m. – 10:30 a.m. and 1:00 p.m. – 3:00 p.m. The SIDA class takes approximately 45 minutes to 1 hour to complete and the applicant must make a 100% on the final test to successfully complete this stage of the badging process. The SAT badge will only be issued after the applicant successfully completes the SIDA class and the Airport Security Division completes the CHRC and receives an approved STA. It may take anywhere from five (5) business days to two (2) weeks before the applicant may be issued a SAT badge.

6) At the end of the contract, the Contractor's Authorizing Signatory shall return all issued airport identification badges to the AS PIO directly and inform the Aviation Department division that managed the contract that all badges have been returned before final payment for the work can be processed. Each SAT badge that is not returned to the PIO is subject to a $75.00 non-returned badge fee.

7) Any lost or stolen SAT ID badge shall be reported to Airport Security immediately by contacting (210) 207-3526 or 207-3433 so the badge can be deactivated. The Contractor's employee must contact Contractor's Authorizing Signatory to make arrangements to complete the necessary paperwork to receive a replacement SAT badge. The Contractor shall be responsible for any fees/fines resulting from the lost, stolen, or otherwise unaccounted for SAT badge.

B) Airfield Driver License:

1) The Airport Operations Office is located at 457 Sandau Rd., San Antonio, TX 78216.

2) It is the sole responsibility of the tenants, airlines or contractors to select the correct training course needed for their employees. There are two types of airfield training courses: non-movement areas and movements areas. Non-movement areas are aprons and parking areas in the Airport Operation Area (AOA). No ATCT clearance is required. Movement w/Restrictions: Taxiways as well as other areas using for taxiing aircraft and aircraft parking areas. ATCT clearance is required.

3) To obtain an Airfield Driver's License an employee must attend an Airport sponsored drivers training class and pass a written test at the end of each class with a 90% or better. The airfield driver license can only be issued to a person passing the test.

4) The non-movement classes are held on every Monday and Tuesday at 9:00 a.m. and Thursday at 1:00 p.m. The movement classes are held every Tuesday at 1:00 p.m. and Thursday at 9:00 a.m. All classes must be scheduled in advance. To schedule a class call Airport Operations at 207-3475.

5) A valid State driver's license and a SAT Security Identification Display Area (SIDA) badge and a copy of certificate of insurance document of the individual's employer with the proper coverage must be presented at the time of the class. The copy of all three items stated must be submitted to the AOO for record on file.

6) You must have radio contact with FAA Air Traffic Controller to receive clearance to cross taxiways at all times.

7) Airfield Driver's Training Program Fees:

Course	Amount:
Non-Movement Area	$ 15.00
Movement Area	$ 20.00
Replacement License	$ 10.00

We will continue sending renewal notices approximately one month in advance to assure that drivers have enough time to schedule to attend the class prior to expiration.

8) For the construction contracts, there is no separate line item on the bid proposal for the costs involved and the costs shall be considered incidental to mobilization expenses.

9) The licensed driver can only travel on the areas authorized and use the gate approved by the Airport Security Office. A driver who loses his or her Airfield Driver License is responsible for reporting the loss immediately to Airport Operations Office. The employee will be responsible to pay the replacement fee for his/her airfield license.

10) The company shall have coverage for the vehicles used inside Air Operations Area for the project involved at all times. An Automobile Liability Policy with no less than a Combined, Single Limit for Bodily Injury and Property Damage of $5,000,000 per occurrence, or its equivalent in Umbrella or Excess Liability Coverage.

In addition, the City of San Antonio must be listed as an "additional insured" in the endorsement section. The Insurance can be under the Company name if a company vehicle will be used and the vehicle must be listed in the insurance policy either specifically by VIN number or generally by covering all autos owned, leased or operated while conducting business on behalf of the company. If this is a private vehicle covered only by personal insurance, the insurance must be under the drivers name and VIN number must be listed. It is the company's responsibility to notify the Aviation Department for any insurance changes.

11) At the end of the project, the authorized Project Manager shall return all airfield driver licenses to the Airport Operations Office and notify Planning and Development and at the end of the return process so that the final payment to the consultants or contractors for the work involved can be processed.

12) Vehicles routinely operating within the Movement area shall have an operating yellow flashing light mounted on the uppermost part of the Vehicle.

EXHIBIT I TO ATTACHMENT A

LIST OF DISQUALIFYING CRIMES

AUTHORIZATION FOR FINGERPRINT-BASED
CRIMINAL HISTORY RECORDS CHECK

Please read and review the following list of disqualifying criminal offenses as listed in Transportation Security Regulation (TSR) 1542.209 (d).

1. Forgery of certificates, false marking of aircraft, and other aircraft registration violations: 49 USC 46302
2. Interference with air navigation: 49 USC 46308
3. Improper transportation of a hazardous material: 49 USC 46312
4. Aircraft Piracy: 49 USC 46502
5. Interference with flight crew members or flight attendants: 49 USC 46504
6. Commission of certain crimes aboard aircraft in flight: 49 USC 46506
7. Carrying a weapon or explosive aboard aircraft: 49 USC 46505
8. Conveying false information and threats: 49 USC 46507
9. Aircraft piracy outside the special aircraft jurisdiction of the United States: 49 USC 46502(b)
10. Lighting violations involving transporting controlled substances: 49 USC 46315
11. Unlawful entry into an aircraft or airport area that serves air carriers or foreign air carriers contrary to established security requirements: 49 USC 46314
12. Destruction of an aircraft or aircraft facility: 18 USC 32
13. Murder
14. Assault with intent to murder
15. Espionage
16. Sedition
17. Kidnapping or hostage taking
18. Treason
19. Rape or aggravated sexual abuse
20. Unlawful possession, use, sale, distribution, or manufacture of an explosive or weapon
21. Extortion
22. Armed or felony unarmed robbery
23. Distribution of, or intent to distribute, a controlled substance
24. Felony arson
25. Felony Involving a threat
26. Felony involving
    1. Willful destruction of property
    2. Importation or manufacture of a controlled substance
    3. Burglary
    4. Theft
    5. Dishonesty, fraud, or misrepresentation
    6. Possession or distribution of stolen property
    7. Aggravated assault
    8. Bribery
    9. Illegal possession of a controlled substance punishable by a maximum term of imprisonment of more than one year
27. Violence at international airports: 18 USC 37
28. Conspiracy or attempt to commit any of the criminal acts listed in this paragraph

FIELD OFFICE AND SHEDS

The Contractor shall furnish a minimum 300 s.f. office with air conditioning and heating, telephone and convenient access to a restroom nearby for the Resident Project Inspector's use during the course of the work. Field office shall be divided to provide a separate room set aside for storage of concrete test specimens and for other testing equipment, material certifications and samples. Furnishing shall include one office desk, two chairs, a drafting table and drafting stool and specimen curing tanks in sufficient size and number to contain the maximum number of test beams anticipated. Tanks shall be provided with thermostatically controlled meters to insure the water temperature is maintained at the prescribed temperatures stated in Item P-501.

Upon completion of the project, the field office and furnishing will remain the property of the Contractor and it is the contractor's responsibility and costs to remove the field office and furniture out of the airport property.

All costs for providing one field office, utilities, furniture, and tanks are incidentals to Item 101, Preparing Right-of-Way.

June 24, 2009

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DIVISION C:

ADDITIONAL REQUIREMENTS FROM THE FAA

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BUY AMERICAN PREFERENCES: (Title 49 U.S.C. Chapter 501)

The successful bidder must comply with Title 49 U.S.C. Section 50101. Unless otherwise formally approved by the Federal Aviation Administration (FAA), all acquired steel and manufactured products installed under the AIP assisted project must be produced in the United States. Section of 50101(b) permits conditional waivers of this preference. Specifically, the FAA will consider a waiver if the bidder can demonstrate:

(1) Applying subsection 50101(a) is inconsistent with the public interest;

(2) The steel and goods produced in the United States are not produced in a sufficient and reasonably available amount or are not of a satisfactory quality;

(3) The cost of components and subcomponents produced in the United States is more than 60 percent of the cost of all components and final assembly occurs within the United States

(4) The inclusion of domestic material will increase the cost of the overall project by more than 25 percent. As a condition of bid responsiveness, Bidder must indicate on the Buy American certification whether it intends to meet Buy American requirements by only installing 100% United States made steel and manufactured products or if they intend to request a permissible waiver to Buy America preferences.

Waivers determinations addressed under exceptions (1) and (2) will generally be made as part of the bid solicitation. Bidder may not request a waiver under exceptions (1) or (2).

The successful bidder that desires a waiver under exception (3) shall make the request by selecting the appropriate certification statement and complying with the following conditions:

- For equipment and material the FAA has already issued a waiver to AIP Buy American preferences as indicated on the current FAA Buy American conformance list, bidder shall submit a listing of specific equipment and material it proposes to install on the project prior to the issuance of a Notice- to-Proceed.

- For equipment and material the FAA has not previously issued a waiver to Buy American preferences, the bidder identified with the apparent low bid agrees to prepare and submit to the owner a waiver request and component calculation information within 15 calendar days of the date of the notice of apparent award of contract.

The successful bidder that desires a waiver under exception (4) shall make the request by selecting the appropriate certification statement and complying with the following conditions:

- Provide detailed proposal costs using domestic product(s) and the overall project cost.

- Provide detailed alternate proposal costs of the non-domestic product(s) and the overall project cost.

- If the proposal with domestic product(s) is more than 25% of the proposal with non-domestic product(s), the bidder may request a waiver under exception (4).

Bidder is hereby advised that Owner approval of any requested waiver is contingent upon approval by the FAA.

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Buy America Certification
(Title 49 U.S.C. Section 50101)

PROJECT NAME:	Runway 12R-30L Rehabilitation and Terminal Area Taxiway Improvements (Package 1)
AIRPORT NAME:	San Antonio International Airport
AIP NUMBER:	

This solicitation and any resulting contract are subject to the Buy America requirements of 49 U.S.C. Section 50101. The bidder certifies it and all associated subcontractors will comply with the Buy American preferences established under Title 49 U.S.C. Section 50101 as follows:

U.S.C. Section 50101 – Buying goods produced in the United States

(a) Preference. – The Secretary of Transportation may obligate an amount that may be appropriated to carry out section 106(k), 44502(a)(2), or 44509, subchapter I of chapter 471 (except section 47127), or chapter 481 (except sections 48102©, 48106, 48107, and 48110) of this title for a project only if steel and manufactured goods used in the project are produced in the United States.

(b) Waiver. – The Secretary may waive subsection (a) of this section if the Secretary finds that –

(1) Applying subsection (a) would be inconsistent with the public interest;

(2) The steel and goods produced in the United States are not produced in a sufficient and reasonably available amount or are not of a satisfactory quality;

(3) When procuring a facility or equipment under section 44502(a)(2) or 44509, subchapter I of chapter 471 (except section 47127), or chapter 481 (except sections 48102©, 48106, 48107, and 48110) of this title –

A. The cost of components and subcomponents produced in the United States is more than 60 percent of the cost of all components of the facility or equipment; and

B. Final assembly of the facility or equipment has occurred in the United States; or

(4) Including domestic material will increase the cost of the overall project by more than 25 percent.

© Labor Costs. – In this section, labor costs involved in final assembly are not included in calculating the cost of components.

* * * * * * *

Please note that approval of waivers listed under (b) (1) & (2) above, can only be approved by the FAA Office of Airports in Washington DC and approval is rare. Waivers listed under (b) (3) & (4) may be approved by FAA Regional or District Offices. A listing of Equipment and Products that have been approved and on the national waiver list may be located at: http://www.faa.gov/airports/aip/procurement/federal_contract_provisions/media/buy_american_waiver.xls

As a matter of bid responsiveness, the bidder or offeror must complete and submit this certification with their bid proposal. The bidder must sign and date the certification. The bidder/offeror must indicate how they propose to comply with the Buy America provision by selecting one of the following certification statements.

- **The bidder hereby certifies that it will comply with Title 49 U.S.C Section 50101(a) by only installing steel and manufactured products produced in the United States of America. The bidder further agrees that if chosen as the apparent low bid, it will submit documentation to the owner that demonstrate all steel and manufactured products are 100% manufactured in the United States.**

- **The bidder hereby certifies that it cannot fully comply with the Buy America preferences of Title 49 U.S.C Section 50101(a); the bidder therefore requests a waiver per Title 49 U.S.C Section 50101(b). The bidder further agrees that upon notification from the Owner, the bidder identified with the apparent low bid agrees to prepare and submit a waiver request and component calculation information to the owner within ___ calendar days of the date of the notice of apparent low bid.**

_____ _____

Bidder's Firm Name *Date*

_____

Signature

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CIVIL RIGHTS ACT OF 1964, TITLE VI – CONTRACTOR CONTRACTUAL REQUIREMENTS

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

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

1.2 Nondiscrimination. The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulations, including employment practices when the contract covers a program set forth in Appendix B of the Regulations.

1.3 Solicitations for Subcontracts, Including Procurements of Materials and Equipment. In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to nondiscrimination on the grounds of race, color, or national origin.

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

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

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

1.6 Incorporation of Provisions. The contractor shall include the provisions of paragraphs 1 through 5 in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Regulations or directives issued pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the sponsor or the FAA may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Sponsor to enter into such litigation to protect the interests of the sponsor and, in addition, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

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AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, SECTION 520 - GENERAL CIVIL RIGHTS PROVISIONS

The contractor assures that it will comply with pertinent statutes, Executive orders and such rules as are promulgated to assure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or handicap be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision obligates the tenant/concessionaire/lessee or its transferee for the period during which Federal assistance is extended to the airport a program, except where Federal assistance is to provide, or is in the form of personal property or real property or interest therein or structures or improvements thereon. In these cases the provision obligates the party or any transferee for the longer of the following periods: (a) the period during which the property is used by the airport sponsor or any transferee for a purpose for which Federal assistance is extended, or for another purpose involving the provision of similar services or benefits or (b) the period during which the airport sponsor or any transferee retains ownership or possession of the property. In the case of contractors, this provision binds the contractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required of Title VI of the Civil Rights Act of 1964.

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LOBBYING AND INFLUENCING FEDERAL EMPLOYEES

(1) No Federal appropriated funds shall be paid, by or on behalf of the contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the making of any Federal grant and the amendment or modification of any Federal grant.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any Federal grant, the contractor shall complete and submit Standard Form-LLL, “Disclosure of Lobby Activities,” in accordance with its instructions.

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ACCESS TO RECORDS AND REPORTS

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

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DISADVANTAGED BUSINESS ENTERPRISES

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

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

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ENERGY CONSERVATION REQUIREMENTS

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

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BREACH OF CONTRACT TERMS

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

Application

The FAA does not prescribe the exact language to be incorporated. The above clause represents sample language that addresses the requirements of 49 CFR Part 18.36(i)(1). This provision requires grantees to incorporate administrative, contractual or legal remedies in instances where contractors violate or breach contract terms. Grantees should consult with their legal counsel to develop the appropriate clause that meets the minimum requirements of 49 CFR Part 18.36.

This provision is required in all contracts that exceed the simplified acquisition threshold, presently set at $100,000.

Reference
49 CFR Part 18.36

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RIGHTS TO INVENTIONS

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

Application
Incorporate into all procurement contracts that funded by AIP funds

Reference
49 CFR Part 18.36(i)(8) FAA Order 5100.38

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TRADE RESTRICTION CLAUSE

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

a. is not owned or controlled by one or more citizens of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);

b. has not knowingly entered into any contract or subcontract for this project with a person that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list;

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

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

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

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

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

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

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

Application
Incorporate into all contracts funded by AIP.

Reference
49 CFR Part 30.13
FAA Order 5100.38

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VETERAN'S PREFERENCE

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

Application
Incorporate into all construction contracts financed under the AIP program.

Reference
Title 49 U.S.C. 47112(c) Advisory Circular 150/5100-6d

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DAVIS BACON REQUIREMENTS

1. Minimum Wages

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

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

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

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

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

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

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

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

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

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

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided*, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2 Withholding.

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

3. Payrolls and basic records.

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

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the applicant, sponsor, or owner, as the case may be, for transmission to the Federal Aviation Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under paragraph 5.5(a)(3)(i) above. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office,

Washington, D.C. 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

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

(1) That the payroll for the payroll period contains the information required to be maintained under paragraph (3)(i) above and that such information is correct and complete;

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

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

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

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

(iii) The contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying or transcription by authorized representatives of the Sponsor, the Federal Aviation Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the
contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first
90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's

registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

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

5. Compliance With Copeland Act Requirements.

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

6. Subcontracts.

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

7. Contract Termination: Debarment.

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

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

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

9. Disputes Concerning Labor Standards.

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

10. Certification of Eligibility.

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

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

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

Application
Incorporate into all construction contracts and subcontracts that exceed $2,000 and are financed under the AIP program.

Reference
29 CFR Part 5.5
Advisory Circular 150/5100-6d

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EQUAL EMPLOYMENT OPPORTUNITY - 41 CFR PART 60-1.4(b)

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

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

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

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

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

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

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

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

Application
Incorporate in all construction contracts and subcontracts that exceed $10,000

Reference
Executive Order 11246
41 CFR Part 60 -1.4
AC 150/5100-15, Para. 22.a.

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CERTIFICATION OF NONSEGREGATED FACILITIES - 41 CFR PART 60-1.8

Notice to Prospective Federally Assisted Construction Contractors

1. A Certification of Non-segregated Facilities shall be submitted prior to the award of a federally- assisted construction contract exceeding $10,000 which is not exempt from the provisions of the Equal Opportunity Clause.

2. Contractors receiving federally-assisted construction contract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of the following notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

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

1. A Certification of Non-segregated Facilities shall be submitted prior to the award of a subcontract exceeding $10,000, which is not exempt from the provisions of the Equal Opportunity Clause.

2. Contractors receiving subcontract awards exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity Clause will be required to provide for the forwarding of this notice to prospective subcontractors for supplies and construction contracts where the subcontracts exceed $10,000 and are not exempt from the provisions of the Equal Opportunity Clause. NOTE: The penalty for making false statements in offers is prescribed in 18 U.S.C. 1001.

CERTIFICATION OF NONSEGREGATED FACILITIES

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

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

Application

Incorporate in all construction contracts and subcontracts that exceed $10,000. The notices should be placed within the solicitation for proposals. The actual certification should be incorporated in the contract agreement.

Reference

Executive Order 11246
41 CFR Part 60 -1.8
AC 150/5100-15, Para. 22.b.

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NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION - 41 CFR PART 60-2

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables

Goals for minority participation for each trade	(Vol. 45 Federal Register pg. 65984 10/3/80)
Goals for female participation in each trade	(6.9%)

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

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

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

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

Application

Incorporate in all construction contracts and subcontracts that exceed $10,000. This notice should be placed within the solicitation for proposals. The goals for minority participation are dependent upon the Economic Area (EA) and Standard Metropolitan Statistical Area (SMSA). Refer to Volume 45 of the Federal Register dated 10/3/80. Page 65984 contains a table listed all EA and SMSA and their associated minority goals. The 6.9% for female participation represents a national goal.

Reference

Executive Order 11246
41 CFR Parts 60 - 4
AC 150/5100-15, Para. 22.c.

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STANDARD FEDERAL EQUAL EMPLOYMENT OPPORTUNITY CONSTRUCTION CONTRACT SPECIFICATIONS - 41 CFR Part 60.4.3

1. As used in these specifications:

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

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

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

d. "Minority" includes:

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

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

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

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

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

3. If the contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

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

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

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

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

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

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

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the contractor by the union or, if referred, not employed by the contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the contractor has a collective bargaining agreement has not referred to the contractor a minority person or female sent by the contractor, or when the contractor has other information that the union referral process has impeded the contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the contractor's employment needs, especially those programs funded or approved by the Department of Labor. The contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions including specific review of these items with onsite supervisory personnel such a superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written

notification to and discussing the contractor's EEO policy with other contractors and subcontractors with whom the contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female recruitment and training organizations serving the contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Application

Incorporate in all construction contracts and subcontracts that exceed $10,000. This provision shall be included in the solicitation and the contract agreement.

Reference

Executive Order 11246
41 CFR Parts 60 – 4.3
AC 150/5100-15, Para. 22.c.

TERMINATION OF CONTRACT

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

b. If the termination is for the convenience of the Sponsor, an equitable adjustment in the contract price shall be made, but no amount shall be allowed for anticipated profit on unperformed services.

c. If the termination is due to failure to fulfill the contractor's obligations, the Sponsor may take over the work and prosecute the same to completion by contract or otherwise. In such case, the contractor shall be liable to the Sponsor for any additional cost occasioned to the Sponsor thereby.

d. If, after notice of termination for failure to fulfill contract obligations, it is determined that the contractor had not so failed, the termination shall be deemed to have been effected for the convenience of the Sponsor. In such event, adjustment in the contract price shall be made as provided in paragraph 2 of this clause.

e. The rights and remedies of the sponsor provided in this clause are in addition to any other rights and remedies provided by law or under this contract.

Application
Incorporate into all procurement contracts that funded by AIP funds that exceed $10,000.

Reference
49 CFR Part 18.36(i)(2) FAA Order 5100.38

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CERTIFICATION REGARDING DEBAREMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

The bidder/offeror certifies, by submission of this proposal or acceptance of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the bidder/offeror/contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

Application

Incorporate into all contracts that exceed $25,000, which funded under the AIP. Incorporate in all contracts for auditing services regardless of the contract amount.

Reference

49 CFR Part 29
FAA Order 5100.38

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CONTRACT WORKHOURS AND SAFETY STANDARDS ACT REQUIREMENTS 29 CFR PART 5

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

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

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

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

Application
Incorporate into all construction contracts and subcontracts that exceed $100,000 and are financed under the AIP program.

Reference
29 CFR Part 5.5
Advisory Circular 150/5100-6d

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CLEAN AIR AND WATER POLLUTION CONTROL

Contractors and subcontractors agree:

a. That any facility to be used in the performance of the contract or subcontract or to benefit from the contract is not listed on the Environmental Protection Agency (EPA) List of Violating Facilities;

b. To comply with all the requirements of Section 114 of the Clean Air Act, as amended, 42 U.S.C. 1857 et.seq. and Section 308 of the Federal Water Pollution Control Act, as amended, 33 U.S.C. 1251 et seq. relating to inspection, monitoring, entry, reports, and information, as well as all other requirements specified in Section 114 and Section 308 of the Acts, respectively, and all other regulations and guidelines issued thereunder;

c. That, as a condition for the award of this contract, the contractor or subcontractor will notify the awarding official of the receipt of any communication from the EPA indicating that a facility to be used for the performance of or benefit from the contract is under consideration to be listed on the EPA List of Violating Facilities;

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

Application
Incorporate in all contracts and subcontracts that exceed $100,000.

Reference
49 CFR Part 18.36(i)(12)
Section 306 of the Clean Air Act
Section 508 of the Clean Water Act

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DIVISION D

FAA CONSTRUCTION SPECIFICATIONS

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PART 1

GENERAL PROVISIONS

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Part 1 – General Provisions

Section 10

Definition of Terms

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

10-01 AASHTO. The American Association of State Highway and Transportation Officials, the successor association to AASHO.

10-02 ACCESS ROAD. The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.

10-03 ADVERTISEMENT. A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

10-04 AIP. The Airport Improvement Program, a grant-in-aid program, administered by the Federal Aviation Administration.

10-05 AIR OPERATIONS AREA. For the purpose of these specifications, the term air operations area shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.

10-06 AIRPORT. Airport means an area of land or water which is used or intended to be used for the landing and takeoff of aircraft; an appurtenant area used or intended to be used for airport buildings or other airport facilities or rights of way; and airport buildings and facilities located in any of these areas, and includes a heliport.

10-07 ASTM. The American Society for Testing and Materials.

10-08 AWARD. The acceptance, by the Owner, of the successful bidder's proposal.

10-09 BIDDER. Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

10-10 BUILDING AREA. An area on the airport to be used, considered, or intended to be used for airport buildings or other airport facilities or rights-of-way together with all airport buildings and facilities located thereon.

10-11 CALENDAR DAY. Every day shown on the calendar.

10-12 CHANGE ORDER. A written order to the Contractor covering changes in the plans, specifications, or proposal quantities and establishing the basis of payment and contract time adjustment, if any, for the work affected by such changes. The work, covered by a change order, shall be within the scope of the contract.

10-13 CONTRACT. The written agreement covering the work to be performed. The awarded contract shall include, but is not limited to: The Advertisement; The Contract Form; The Proposal; The Performance Bond; The Payment Bond; any required insurance certificates; The Specifications; The Plans, and any addenda issued to bidders.

10-14 CONTRACT ITEM (PAY ITEM). A specific unit of work for which a price is provided in the contract.

10-15 CONTRACT TIME. The number of calendar days or working days, stated in the proposal, allowed for completion of the contract, including authorized time extensions. If a calendar date of completion is stated in the proposal, in lieu of a number of calendar or working days, the contract shall be completed by that date.

10-16 CONTRACTOR. The individual, partnership, firm, or corporation primarily liable for the acceptable performance of the work contracted and for the payment of all legal debts pertaining to the work who acts directly or through lawful agents or employees to complete the contract work.

10-17 DRAINAGE SYSTEM. The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.

10-18 ENGINEER. The individual, partnership, firm, or corporation duly authorized by the Owner to be responsible for engineering inspection of the contract work and acting directly or through an authorized representative.

10-19 EQUIPMENT. All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.

10-20 EXTRA WORK. An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which is found by the Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.

10-21 FAA. The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his/her duly authorized representative.

10-22 FEDERAL SPECIFICATIONS. The Federal Specifications and Standards, Commercial Item Descriptions, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government.

10-23 FORCE ACCOUNT. Force account construction work is construction that is accomplished through the use of material, equipment, labor, and supervision provided by the Owner or by another public agency pursuant to an agreement with the Owner.

10-24 INSPECTOR. An authorized representative of the Engineer assigned to make all necessary inspections and/or tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

10-25 INTENTION OF TERMS. Whenever, in these specifications or on the plans, the words “directed,” “required,” “permitted,” “ordered,” “designated,” “prescribed,” or words of like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Engineer is intended; and similarly, the words “approved,” “acceptable,” “satisfactory,” or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Engineer, subject in each case to the final determination of the Owner.

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

10-26 LABORATORY. The official testing laboratories of the Owner or such other laboratories as may be designated by the Engineer.

10-27 LIGHTING. A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

10-28 MAJOR AND MINOR CONTRACT ITEMS. A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 20 percent of the total amount of the award contract. All other items shall be considered minor contract items.

10-29 MATERIALS. Any substance specified for use in the construction of the contract work.

10-30 NOTICE TO PROCEED. A written notice to the Contractor to begin the actual contract work on a previously agreed to date. If applicable, the Notice to Proceed shall state the date on which the contract time begins.

10-31 OWNER. The term "Owner" shall mean the party of the first part or the contracting agency signatory to the contract. For AIP contracts, the term "sponsor" shall have the same meaning as the term "Owner." Where the term "Owner" is capitalized in this document, it shall mean airport owner or sponsor only.

10-32 PAVEMENT. The combined surface course, base course, and subbase course, if any, considered as a single unit.

10-33 PAYMENT BOND. The approved form of security furnished by the Contractor and his/her surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the work.

10-34 PERFORMANCE BOND. The approved form of security furnished by the Contractor and his/her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.

10-35 PLANS. The official drawings or exact reproductions which show the location, character, dimensions and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.

10-36 PROJECT. The agreed scope of work for accomplishing specific airport development with respect to a particular airport.

10-37 PROPOSAL. The written offer of the bidder (when submitted on the approved proposal form) to perform the contemplated work and furnish the necessary materials in accordance with the provisions of the plans and specifications.

10-38 PROPOSAL GUARANTY. The security furnished with a proposal to guarantee that the bidder will enter into a contract if his/her proposal is accepted by the Owner.

10-39 RUNWAY. The area on the airport prepared for the landing and takeoff of aircraft.

10-40 SPECIFICATIONS. A part of the contract containing the written directions and requirements for completing the contract work. Standards for specifying materials or testing which are cited in the contract specifications by reference shall have the same force and effect as if included in the contract physically.

10-41 SPONSOR. See definition above of "Owner."

10-42 STRUCTURES. Airport facilities such as bridges; culverts; catch basins, inlets, retaining walls, cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

10-43 SUBGRADE. The soil that forms the pavement foundation.

10-44 SUPERINTENDENT. The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instructions from the Engineer, and who shall supervise and direct the construction.

10-45 SUPPLEMENTAL AGREEMENT. A written agreement between the Contractor and the Owner covering (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25 percent, such increased or decreased work being within the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.

10-46 SURETY. The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds that are furnished to the Owner by the Contractor.

10-47 TAXIWAY. For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways or aircraft parking areas.

10-48 WORK. The furnishing of all labor, materials, tools, equipment, and incidentals necessary or convenient to the Contractor's performance of all duties and obligations imposed by the contract, plans, and specifications.

10-49 WORKING DAY. A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least 6 hours toward completion of the contract. When work is suspended for causes beyond the Contractor's control, Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered as working days.

END OF SECTION 10

Section 20

Proposal Requirements and Conditions

20-01 ADVERTISEMENT (Notice to Bidders).

The Owner has published the advertisement at such places and at such times as are required by local law or ordinances. The published advertisement states the time and place for submitting sealed proposals; a description of the proposed work; instructions to bidders as to obtaining proposal forms, plans, and specifications; proposal guaranty required; and the Owner's right to reject any and all bids

20-02 PREQUALIFICATION OF BIDDERS. Each bidder shall furnish the owner satisfactory evidence of his/her competency to perform the proposed work. Such evidence of competency, unless otherwise specified, shall consist of statements covering the bidder's past experience on similar work, a list of equipment that would be available for the work, and a list of key personnel that would be available. In addition, each bidder shall furnish the owner satisfactory evidence of his/her financial responsibility. Such evidence of financial responsibility, unless otherwise specified, shall consist of a confidential statement or report of the bidder's financial resources and liabilities as of the last calendar year or the Contractor's last fiscal year. Such statements or reports shall be certified by a public accountant. At the time of submitting such financial statements or reports, the bidder shall further certify whether his/her financial responsibility is approximately the same as stated or reported by the public accountant. If the bidder's financial responsibility has changed, the bidder shall qualify the public accountant's statement or report to reflect his/her (bidder's) true financial condition at the time such qualified statement or report is submitted to the Owner.

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

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

20-03 CONTENTS OF PROPOSAL FORMS. The Owner shall furnish bidders with proposal forms. All papers bound with or attached to the proposal forms are necessary parts and must not be detached.

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

20-04 ISSUANCE OF PROPOSAL FORMS. The Owner reserves the right to refuse to issue a proposal form to a prospective bidder should such bidder be in default for any of the following reasons:

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

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

c. Contractor default under previous contracts with the Owner.

d. Unsatisfactory work on previous contracts with the Owner.

20-05 INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES. An estimate of quantities of work to be done and materials to be furnished under these specifications is given in the proposal. It is

the result of careful calculations and is believed to be correct. It is given only as a basis for comparison of proposals and the award of the contract. The Owner does not expressly or by implication agree that the actual quantities involved will correspond exactly therewith; nor shall the bidder plead misunderstanding or deception because of such estimates of quantities, or of the character, location, or other conditions pertaining to the work. Payment to the Contractor will be made only for the actual quantities of work performed or materials furnished in accordance with the plans and specifications. It is understood that the quantities may be increased or decreased as hereinafter provided in the subsection titled ALTERATION OF WORK AND QUANTITIES of Section 40 without in any way invalidating the unit bid prices.

20-06 EXAMINATION OF PLANS, SPECIFICATIONS, AND SITE. The bidder is expected to carefully examine the site of the proposed work, the proposal, plans specifications, and contract forms. He shall satisfy himself as to the character, quality, and quantities of work to be performed, materials to be furnished, and as to the requirements of the proposed contract. The submission of a proposal shall be prima facie evidence that the bidder has made such examination and is satisfied as to the conditions to be encountered in performing the work and as to the requirements of the proposed contract, plans, and specifications.

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

20-07 PREPARATION OF PROPOSAL. The bidder shall submit his/her proposal on the forms furnished by the Owner. All blank spaces in the proposal forms must be correctly filled in where indicated for each and every item for which a quantity is given. The bidder shall state the price (written in ink or typed) both in words and numerals for which he proposes to do each pay item furnished in the proposal. In case of conflict between words and numerals, the words, unless obviously incorrect, shall govern.

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

20-08 IRREGULAR PROPOSALS. Proposals shall be considered irregular for the following reasons:

Prospective Bidders are directed to the City of San Antonio Specification 040 Standard Instructions to Respondents.

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

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

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

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

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

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

20-09 BID GUARANTEE. Each separate proposal shall be accompanied by a certified check, or other specified acceptable collateral, in the amount specified in the proposal form. Such check, or collateral, shall be made payable to the Owner.

Prospective Bidders are directed to the City of San Antonio Specification 040 Standard Instructions to Respondents.

20-10 DELIVERY OF PROPOSAL. Each proposal submitted shall be placed in a sealed envelope plainly marked with the project number, location of airport, and name and business address of the bidder on the outside. When sent by mail, preferably registered, the sealed proposal, marked as indicated above, should be enclosed in an additional envelope. No proposal will be considered unless received at the place specified in the advertisement before the time specified for opening all bids. Proposals received after the bid opening time shall be returned to the bidder unopened.

20-11 WITHDRAWAL OR REVISION OF PROPOSALS. A bidder may withdraw or revise (by withdrawal of one proposal and submission of another) a proposal provided that the bidder's request for withdrawal is received by the Owner in writing or by telegram before the time specified for opening bids. Revised proposals must be received at the place specified in the advertisement before the time specified for opening all bids.

20-12 PUBLIC OPENING OF PROPOSALS. Proposals shall be opened, and read, publicly at the time and place specified in the advertisement. Bidders, their authorized agents, and other interested persons are invited to attend. Proposals that have been withdrawn (by written or telegraphic request) or received after the time specified for opening bids shall be returned to the bidder unopened.

20-13 DISQUALIFICATION OF BIDDERS. A bidder shall be considered disqualified for any of the following reasons:

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

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

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

END OF SECTION 20

Section 30

Award and Execution of Contract

30-01 CONSIDERATION OF PROPOSALS. After the proposals are publicly opened and read, they will be compared on the basis of the summation of the products obtained by multiplying the estimated quantities shown in the proposal by the unit bid prices. If a bidder's proposal contains a discrepancy between unit bid prices written in words and unit bid prices written in numbers, the unit price written in words shall govern.

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

a. If the proposal is irregular as specified in the subsection titled IRREGULAR PROPOSALS of Section 20.

b. If the bidder is disqualified for any of the reasons specified in the subsection titled DISQUALIFICATION OF BIDDERS of Section 20.

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

30-02 AWARD OF CONTRACT. The award of a contract, if it is to be awarded, shall be made within 120 calendar days of the date specified for publicly opening proposals, unless otherwise specified herein.

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

30-03 CANCELLATION OF AWARD. The Owner reserves the right to cancel the award without liability to the bidder, except return of proposal guaranty, at any time before a contract has been fully executed by all parties and is approved by the Owner in accordance with the subsection titled APPROVAL OF CONTRACT of this section.

30-04 RETURN OF PROPOSAL GUARANTY. All proposal guaranties, except those of the two lowest bidders, will be returned immediately after the Owner has made a comparison of bids as hereinbefore specified in the subsection titled CONSIDERATION OF PROPOSALS of this section. Proposal guaranties of the two lowest bidders will be retained by the Owner until such time as an award is made, at which time, the unsuccessful bidder's proposal guaranty will be returned. The successful bidder's proposal guaranty will be returned as soon as the Owner receives the contracts bonds as specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section.

30-05 REQUIREMENTS OF CONTRACT BONDS. At the time of the execution of the contract, the successful bidder shall furnish the Owner a surety bond or bonds that have been fully executed by the bidder and the surety guaranteeing the performance of the work and the payment of all legal debts that may be incurred by reason of the Contractor's performance of the work. The surety and the form of the bond or bonds shall be acceptable to the Owner. Unless otherwise specified in this subsection, the surety bond or bonds shall be in a sum equal to the full amount of the contract.

30-06 EXECUTION OF CONTRACT. The successful bidder shall sign (execute) the necessary agreements for entering into the contract and return such signed contract to the owner, along with the fully executed surety bond or bonds specified in the subsection titled REQUIREMENTS OF

CONTRACT BONDS of this section, within 15 calendar days from the date mailed or otherwise delivered to the successful bidder. If the contract is mailed, special handling is recommended.

49 CFR Part 26 provides that each contract the owner signs with a contractor (and each subcontract the prime contractor signs with a subcontractor) shall include the following assurance:

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

30-07 APPROVAL OF CONTRACT. Upon receipt of the contract and contract bond or bonds that have been executed by the successful bidder, the Owner shall complete the execution of the contract in accordance with local laws or ordinances, and return the fully executed contract to the Contractor. Delivery of the fully executed contract to the Contractor shall constitute the Owner's approval to be bound by the successful bidder's proposal and the terms of the contract.

30-08 FAILURE TO EXECUTE CONTRACT. Failure of the successful bidder to execute the contract and furnish an acceptable surety bond or bonds within the 15 calendar day period specified in the subsection titled REQUIREMENTS OF CONTRACT BONDS of this section shall be just cause for cancellation of the award and forfeiture of the proposal guaranty, not as a penalty, but as liquidation of damages to the Owner.

END OF SECTION 30

Section 40

Scope of Work

40-01 INTENT OF CONTRACT. The intent of the contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor shall furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

40-02 ALTERATION OF WORK AND QUANTITIES. The owner reserves and shall have the right to make such alterations in the work as may be necessary or desirable to complete the work originally intended in an acceptable manner. Unless otherwise specified herein, the Engineer shall be and is hereby authorized to make such alterations in the work as may increase or decrease the originally awarded contract quantities, provided that the aggregate of such alterations does not change the total contract cost or the total cost of any major contract item by more than 25 percent (total cost being based on the unit prices and estimated quantities in the awarded contract). Alterations that do not exceed the 25 percent limitation shall not invalidate the contract nor release the surety, and the Contractor agrees to accept payment for such alterations as if the altered work had been a part of the original contract. These alterations that are for work within the general scope of the contract shall be covered by "Change Orders" issued by the Engineer. Change orders for altered work shall include extensions of contract time where, in the Engineer's opinion, such extensions are commensurate with the amount and difficulty of added work.

Should the aggregate amount of altered work exceed the 25 percent limitation hereinbefore specified, such excess altered work shall be covered by supplemental agreement. If the owner and the Contractor are unable to agree on a unit adjustment for any contract item that requires a supplemental agreement, the owner reserves the right to terminate the contract with respect to the item and make other arrangements for its completion.

All supplemental agreements shall require consent of the Contractor's surety and separate performance and payment bonds.

For AIP contracts this subsection should advise the Contractor that all supplemental agreements shall be approved by the FAA and shall include valid wage determinations of the U.S. Secretary of Labor when the amount of the supplemental agreement exceeds $2,000. However, if the Contractor elects to waive the limitations on work that increase or decrease the originally awarded contract or any major contract item by more than 25 percent, the supplemental agreement shall be subject to the same U.S. Secretary of Labor wage determination as was included in the originally awarded contract.

40-03 OMITTED ITEMS. The Engineer may, in the Owner's best interest, omit from the work any contract item, except major contract items. Major contract items may be omitted by a supplemental agreement. Such omission of contract items shall not invalidate any other contract provision or requirement.

Should a contract item be omitted or otherwise ordered to be nonperformed, the Contractor shall be paid for all work performed toward completion of such item prior to the date of the order to omit such item. Payment for work performed shall be in accordance with the subsection titled PAYMENT FOR OMITTED ITEMS of Section 90.

40-04 EXTRA WORK. Should acceptable completion of the contract require the Contractor to perform an item of work for which no basis of payment has been provided in the original contract or previously issued change orders or supplemental agreements, the same shall be called "Extra Work." Extra Work that is within the general scope of the contract shall be covered by written change order. Change orders for such Extra Work shall contain agreed unit prices for performing the change order work in accordance

with the requirements specified in the order, and shall contain any adjustment to the contract time that, in the Engineer's opinion, is necessary for completion of such Extra Work.

When determined by the Engineer to be in the Owner's best interest, he may order the Contractor to proceed with Extra Work by force account as provided in the subsection titled PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK of Section 90.

Extra Work that is necessary for acceptable completion of the project, but is not within the general scope of the work covered by the original contract shall be covered by a Supplemental Agreement as hereinbefore defined in the subsection titled SUPPLEMENTAL AGREEMENT of Section 10.

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

40-05 MAINTENANCE OF TRAFFIC. It is the explicit intention of the contract that the safety of aircraft, as well as the Contractor's equipment and personnel, is the most important consideration. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas of the airport with respect to his/her own operations and the operations of all his/her subcontractors as specified in the subsection titled LIMITATION OF OPERATIONS of Section 80. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft while operating to, from, and upon the airport as specified in the subsection titled CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS in Section 70.

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

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

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

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

40-06 REMOVAL OF EXISTING STRUCTURES. All existing structures encountered within the established lines, grades, or grading sections shall be removed by the Contractor, unless such existing structures are otherwise specified to be relocated, adjusted up or down, salvaged, abandoned in place, reused in the work or to remain in place. The cost of removing such existing structures shall not be measured or paid for directly, but shall be included in the various contract items.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the plans, the Engineer shall be notified prior to disturbing such structure.

The disposition of existing structures so encountered shall be immediately determined by the Engineer in accordance with the provisions of the contract.

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

40-07 RIGHTS IN AND USE OF MATERIALS FOUND IN THE WORK. Should the Contractor encounter any material such as (but not restricted to) sand, stone, gravel, slag, or concrete slabs within the established lines, grades, or grading sections, the use of which is intended by the terms of the contract to be either embankment or waste, he may at his/her option either:

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

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

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

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

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

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

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

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

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

40-08 FINAL CLEANING UP. Upon completion of the work and before acceptance and final payment will be made, the Contractor shall remove from the site all machinery, equipment, surplus and discarded materials, rubbish, temporary structures, and stumps or portions of trees. He shall cut all brush and woods within the limits indicated and shall leave the site in a neat and presentable condition. Material cleared from the site and deposited on adjacent property will not be considered as having been disposed of satisfactorily, unless the Contractor has obtained the written permission of such property owner.

END OF SECTION 40

Section 50

Control of Work

50-01 AUTHORITY OF THE ENGINEER. The Engineer shall decide any and all questions which may arise as to the quality and acceptability of materials furnished, work performed, and as to the manner of performance and rate of progress of the work. The Engineer shall decide all questions that may arise as to the interpretation of the specifications or plans relating to the work. The Engineer shall determine the amount and quality of the several kinds of work performed and materials furnished which are to be paid for the under contract.

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

50-02 CONFORMITY WITH PLANS AND SPECIFICATIONS. All work and all materials furnished shall be in reasonably close conformity with the lines, grades, grading sections, cross sections, dimensions, material requirements, and testing requirements that are specified (including specified tolerances) in the contract, plans or specifications.

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

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

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

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

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

50-03 COORDINATION OF CONTRACT, PLANS, AND SPECIFICATIONS. The contract, plans, specifications, and all referenced standards cited are essential parts of the contract requirements. A requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work. In case of discrepancy, calculated dimensions will govern over scaled dimensions; contract technical specifications shall govern over contract general provisions, plans, cited standards for materials or testing, and cited FAA advisory circulars; contract general provisions shall govern over plans, cited standards for materials or testing, and cited FAA advisory circulars; plans shall govern over cited standards for materials or testing and cited FAA advisory circulars. If any paragraphs contained in the Special Provisions conflict with General Provisions or Technical Specifications, the Special Provisions shall govern.

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

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

LIST OF SPECIAL PROVISIONS

Prospective Bidders shall review the Special Provisions in the City of San Antonio contract Documents.

50-04 COOPERATION OF CONTRACTOR. The Contractor will be supplied with five copies each of the plans and specifications. He shall have available on the work at all times one copy each of the plans and specifications. Additional copies of plans and specifications may be obtained by the Contractor for the cost of reproduction.

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

50-05 COOPERATION BETWEEN CONTRACTORS. The Owner reserves the right to contract for and perform other or additional work on or near the work covered by this contract.

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

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

The Contractor shall arrange his/her work and shall place and dispose of the materials being used so as not to interfere with the operations of the other Contractors within the limits of the same project. He shall

join his/her work with that of the others in an acceptable manner and shall perform it in proper sequence to that of the others.

50-06 CONSTRUCTION LAYOUT AND STAKES. The Engineer shall establish horizontal and vertical control only. The Contractor must establish all layout required for the construction of the work. Such stakes and markings as the Engineer may set for either his/her own or the Contractor's guidance shall be preserved by the Contractor. In case of negligence on the part of the Contractor, or his/her employees, resulting in the destruction of such stakes or markings, an amount equal to the cost of replacing the same may be deducted from subsequent estimates due the Contractor at the discretion of the Engineer.

The Contractor will be required to furnish all lines, grades and measurements from the control points necessary for the proper prosecution and control of the work contracted for under these specifications.

The Contractor must give weekly copies of the survey notes to the Engineer so that the Engineer may check them as to accuracy and method of staking. All areas that are staked by the Contractor must be checked by the Engineer prior to beginning any work in the area. The Engineer will make periodic checks of the grades and alignment set by the Contractor. In case of error on the part of the Contractor, or his/her employees, resulting in establishing grades and/or alignment that are not in accordance with the plans or established by the Engineer, all construction not in accordance with the established grades and/or alignment shall be replaced without additional cost to the Owner.

No direct payment will be made, unless otherwise specified in contract documents, for this labor, materials, or other expenses therewith. The cost thereof shall be included in the price of the bid for the various items of the Contract.

Construction Staking and Layout includes but is not limited to:

Clearing and Grubbing perimeter staking.

Rough Grade slope stakes at 100-foot stations.

Drainage Swales slope stakes and flow line blue tops at 50-foot stations.

Subgrade blue tops at 25-foot stations and 25-foot offset distance (max.) for the following section locations:

a. Runway – minimum 5 per station

b. Taxiways – minimum 3 per station

c. Holding apron areas – minimum 3 per station

d. Roadways – minimum 3 per station

Base Course blue tops at 25 foot stations and 25-foot offset distance (max.) for the following section locations:

a. Runway – minimum 5 per station

b. Taxiways – minimum 3 per station

c. Holding apron areas – minimum 3 per station

Pavement areas:

a. Edge of Pavement hubs and tacks (for stringline by Contractor) at 100-foot stations

b. Between Lifts at 25-foot stations for the following section locations:

(1). Runways – each paving lane width

(2). Taxiways – each paving lane width

(3). Holding areas – each paving lane width

c. After finish paving operations at 50-foot stations

(1). All paved areas – Edge of each paving lane prior to next paving lot

d. Shoulder and safety area blue tops at 50-foot stations and at all break points with maximum of 50 foot offsets

Fence lines at 100-foot stations

Electrical and Communications System locations, lines and grades including but not limited to duct runs, connections, fixtures, signs, lights, VASIs, PAPIs, REILs, Wind Cones, Distance Markers (signs), pull boxes and manholes.

Drain lines, cut stakes and alignment on 25-foot stations, inlet and manholes.

Painting and Striping layout (pinned with 1.5 in PK nails) marked for paint Contractor. (All nails shall be removed after painting)

Laser, or other automatic control devices, shall be checked with temporary control point or grade hub at a minimum of once per 400 feet per pass (that is, paving lane).

Note: Controls and stakes disturbed or suspect of having been disturbed shall be checked and/or reset as directed by the Engineer without additional cost to the Owner.

50-07 AUTOMATICALLY CONTROLLED EQUIPMENT. Whenever batching or mixing plant equipment is required to be operated automatically under the contract and a breakdown or malfunction of the automatic controls occurs, the equipment may be operated manually or by other methods for a period 48 hours following the breakdown or malfunction, provided this method of operations will produce results which conform to all other requirements of the contract.

50-08 AUTHORITY AND DUTIES OF INSPECTORS. Inspectors employed by the Owner shall be authorized to inspect all work done and all material furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials to be used. Inspectors are not authorized to revoke, alter, or waive any provision of the contract. Inspectors are not authorized to issue instructions contrary to the plans and specifications or to act as foreman for the Contractor.

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

50-09 INSPECTION OF THE WORK. All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with such information and assistance by the Contractor as is required to make a complete and detailed inspection.

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

Any work done or materials used without supervision or inspection by an authorized representative of the Owner may be ordered removed and replaced at the Contractor’s expense unless the Owner’s

representative failed to inspect after having been given reasonable notice in writing that the work was to be performed.

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

50-10 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK. All work that does not conform to the requirements of the contract, plans, and specifications will be considered unacceptable, unless otherwise determined acceptable by the Engineer as provided in the subsection titled CONFORMITY WITH PLANS AND SPECIFICATIONS of this section.

Unacceptable work, whether the result of poor workmanship, use of defective materials, damage through carelessness, or any other cause found to exist prior to the final acceptance of the work, shall be removed immediately and replaced in an acceptable manner in accordance with the provisions of the subsection titled CONTRACTOR'S RESPONSIBILITY FOR WORK of Section 70.

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

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

50-11 LOAD RESTRICTIONS. The Contractor shall comply with all legal load restrictions in the hauling of materials on public roads beyond the limits of the work. A special permit will not relieve the Contractor of liability for damage that may result from the moving of material or equipment.

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

50-12 MAINTENANCE DURING CONSTRUCTION. The Contractor shall maintain the work during construction and until the work is accepted. This maintenance shall constitute continuous and effective work prosecuted day by day, with adequate equipment and forces so that the work is maintained in satisfactory condition at all times.

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

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

50-13 FAILURE TO MAINTAIN THE WORK. Should the Contractor at any time fail to maintain the work as provided in the subsection titled MAINTENANCE DURING CONSTRUCTION of this section, the Engineer shall immediately notify the Contractor of such noncompliance. Such notification shall specify a reasonable time within which the Contractor shall be required to remedy such unsatisfactory maintenance condition. The time specified will give due consideration to the exigency that exists.

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

50-14 PARTIAL ACCEPTANCE. If at any time during the prosecution of the project the Contractor substantially completes a usable unit or portion of the work, the occupancy of which will benefit the Owner, he may request the Engineer to make final inspection of that unit. If the Engineer finds upon inspection that the unit has been satisfactorily completed in compliance with the contract, he may accept it as being completed, and the Contractor may be relieved of further responsibility for that unit. Such partial acceptance and beneficial occupancy by the Owner shall not void or alter any provision of the contract.

50-15 FINAL ACCEPTANCE. Upon due notice from the Contractor of presumptive completion of the entire project, the Engineer and Owner will make an inspection. If all construction provided for and contemplated by the contract is found to be completed in accordance with the contract, plans, and specifications, such inspection shall constitute the final inspection. The Engineer shall notify the Contractor in writing of final acceptance as of the date of the final inspection.

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

50-16 CLAIMS FOR ADJUSTMENT AND DISPUTES. If for any reason the Contractor deems that additional compensation is due him for work or materials not clearly provided for in the contract, plans, or specifications or previously authorized as extra work, he shall notify the Engineer in writing of his/her intention to claim such additional compensation before he begins the work on which he bases the claim. If such notification is not given or the Engineer is not afforded proper opportunity by the Contractor for keeping strict account of actual cost as required, then the Contractor hereby agrees to waive any claim for such additional compensation. Such notice by the Contractor and the fact that the Engineer has kept account of the cost of the work shall not in any way be construed as proving or substantiating the validity of the claim. When the work on which the claim for additional compensation is based has been completed, the Contractor shall, within 10 calendar days, submit his/her written claim to the Engineer who will present it to the Owner for consideration in accordance with local laws or ordinances.

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

END OF SECTION 50

Section 60

Control of Materials

60-01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS. The materials used on the work shall conform to the requirements of the contract, plans, and specifications. Unless otherwise specified, such materials that are manufactured or processed shall be new (as compared to used or reprocessed).

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

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

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

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

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

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

See the Plans and Technical Specifications for specific information.

60-02 SAMPLES, TESTS, AND CITED SPECIFICATIONS. Unless otherwise designated, all materials used in the work shall be inspected, tested, and approved by the Engineer before incorporation in the work. Any work in which untested materials are used without approval or written permission of the Engineer shall be performed at the Contractor's risk. Materials found to be unacceptable and unauthorized will not be paid for and, if directed by the Engineer, shall be removed at the Contractor's expense.

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

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

The Contractor shall employ a testing organization to perform all Contractor required tests. The Contractor shall submit to the Engineer resumes on all testing organizations and individual persons who will be performing the tests. The Engineer will determine if such persons are qualified. All the test data shall be reported to the Engineer after the results are known. A legible, handwritten copy of all test data shall be given to the Engineer daily, along with printed reports, in an approved format, on a weekly basis.

After completion of the project, and prior to final payment, the Contractor shall submit a final report to the Engineer showing all test data reports, plus an analysis of all results showing ranges, averages, and corrective action taken on all failing tests.

60-03 CERTIFICATION OF COMPLIANCE. The Engineer may permit the use, prior to sampling and testing, of certain materials or assemblies when accompanied by manufacturer's certificates of compliance stating that such materials or assemblies fully comply with the requirements of the contract. The certificate shall be signed by the manufacturer. Each lot of such materials or assemblies delivered to the work must be accompanied by a certificate of compliance in which the lot is clearly identified.

Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

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

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

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

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

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

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

60-04 PLANT INSPECTION. The Engineer or his/her authorized representative may inspect, at its source, any specified material or assembly to be used in the work. Manufacturing plants may be inspected from time to time for the purpose of determining compliance with specified manufacturing methods or materials to be used in the work and to obtain samples required for his/her acceptance of the material or assembly.

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

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

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

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

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

60-05 ENGINEER'S FIELD OFFICE. The Contractor shall furnish for the duration of the project one building for the use of the field engineers and inspectors, as a field office. This facility shall be an

approved weatherproof building meeting the current State Highway Specifications (for example, Class I Field Office or Type C Structure). This building shall be located conveniently near to the construction and shall be separate from any building used by the Contractor. A land line telephone and answering machine shall be provided. The Contractor shall be responsible for payment of the basic monthly charge and local calls only. Any Long Distance Tolls shall be the responsibility of the caller. The Contractor shall furnish [FAX machine, photocopy machine, water, sanitary facilities, heat, air conditioning, and electricity].

60-06 STORAGE OF MATERIALS. Materials shall be so stored as to assure the preservation of their quality and fitness for the work. Stored materials, even though approved before storage, may again be inspected prior to their use in the work. Stored materials shall be located so as to facilitate their prompt inspection. The Contractor shall coordinate the storage of all materials with the Engineer. Materials to be stored on airport property shall not create an obstruction to air navigation nor shall they interfere with the free and unobstructed movement of aircraft. Unless otherwise shown on the plans, the storage of materials and the location of the Contractor's plant and parked equipment or vehicles shall be as directed by the Engineer. Private property shall not be used for storage purposes without written permission of the owner or lessee of such property. The Contractor shall make all arrangements and bear all expenses for the storage of materials on private property. Upon request, the Contractor shall furnish the Engineer a copy of the property owner's permission.

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

60-07 UNACCEPTABLE MATERIALS. Any material or assembly that does not conform to the requirements of the contract, plans, or specifications shall be considered unacceptable and shall be rejected. The Contractor shall remove any rejected material or assembly from the site of the work, unless otherwise instructed by the Engineer.

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

60-08 OWNER FURNISHED MATERIALS. The Contractor shall furnish all materials required to complete the work, except those specified herein (if any) to be furnished by the Owner. Owner-furnished materials shall be made available to the Contractor at the location specified herein.

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

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

END OF SECTION 60

Section 70

Legal Regulations and Responsibility to Public

70-01 LAWS TO BE OBSERVED. The Contractor shall keep fully informed of all Federal and state laws, all local laws, ordinances, and regulations and all orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the work, or which in any way affect the conduct of the work. He shall at all times observe and comply with all such laws, ordinances, regulations, orders, and decrees; and shall protect and indemnify the Owner and all his/her officers, agents, or servants against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by himself or his/her employees.

70-02 PERMITS, LICENSES, AND TAXES. The Contractor shall procure all permits and licenses, pay all charges, fees, and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the work.

70-03 PATENTED DEVICES, MATERIALS, AND PROCESSES. If the Contractor is required or desires to use any design, device, material, or process covered by letters of patent or copyright, he shall provide for such use by suitable legal agreement with the patentee or owner. The Contractor and the surety shall indemnify and save harmless the Owner, any third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and damages which it may be obliged to pay by reason of an infringement, at any time during the prosecution or after the completion of the work.

70-04 RESTORATION OF SURFACES DISTURBED BY OTHERS. The Owner reserves the right to authorize the construction, reconstruction, or maintenance of any public or private utility service, FAA or National Oceanic and Atmospheric Administration (NOAA) facility, or a utility service of another government agency at any time during the progress of the work. To the extent that such construction, reconstruction, or maintenance has been coordinated with the Owner, such authorized work (by others) is indicated as follows:

See the Plans and Technical Specifications for Specific Information.

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

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

70-05 FEDERAL AID PARTICIPATION. For AIP contracts, the United States Government has agreed to reimburse the Owner for some portion of the contract costs. Such reimbursement is made from time to time upon the Owner's request to the FAA. In consideration of the United States Government's (FAA's) agreement with the Owner, the Owner has included provisions in this contract pursuant to the

requirements of Title 49 of the United States Code (USC) and the Rules and Regulations of the FAA that pertain to the work.

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

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

70-06 SANITARY, HEALTH, AND SAFETY PROVISIONS. The Contractor shall provide and maintain in a neat, sanitary condition such accommodations for the use of his/her employees as may be necessary to comply with the requirements of the state and local Board of Health, or of other bodies or tribunals having jurisdiction.

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

70-07 PUBLIC CONVENIENCE AND SAFETY. The Contractor shall control his/her operations and those of his/her subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft and vehicular traffic with respect to his/her own operations and those of his/her subcontractors and all suppliers in accordance with the subsection titled MAINTENANCE OF TRAFFIC of Section 40 hereinbefore specified and shall limit such operations for the convenience and safety of the traveling public as specified in the subsection titled LIMITATION OF OPERATIONS of Section 80 hereinafter.

70-08 BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS. The Contractor shall furnish, erect, and maintain all barricades, warning signs, and markings for hazards necessary to protect the public and the work. When used during periods of darkness, such barricades, warning signs, and hazard markings shall be suitably illuminated. Unless otherwise specified, barricades, warning signs, and markings for hazards that are in the air operations area shall be a maximum of 18 in high. Unless otherwise specified, barricades shall be spaced not more than 25 feet apart. Barricades, warning signs, and markings shall be paid for under Section 40-05.

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

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

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

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

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

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

70-09 USE OF EXPLOSIVES. ~~When the use of explosives is necessary for the prosecution of the work, the Contractor shall exercise the utmost care not to endanger life or property, including new work. The Contractor shall be responsible for all damage resulting from the use of explosives.~~

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

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

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

70-10 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE. The Contractor shall be responsible for the preservation of all public and private property, and shall protect carefully from disturbance or damage all land monuments and property markers until the Engineer has witnessed or otherwise referenced their location and shall not move them until directed.

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

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, or in consequence of the non-execution thereof by the Contractor, he shall restore, at his/her own expense, such property to a condition similar or equal to that existing before such damage or injury was done, by repairing, or otherwise restoring as may be directed, or he shall make good such damage or injury in an acceptable manner.

70-11 RESPONSIBILITY FOR DAMAGE CLAIMS. The Contractor shall indemnify and save harmless the Engineer and the Owner and their officers, and employees from all suits actions, or claims of any character brought because of any injuries or damage received or sustained by any person, persons, or property on account of the operations of the Contractor; or on account of or in consequence of any neglect in safeguarding the work; or through use of unacceptable materials in constructing the work; or because of any act or omission, neglect, or misconduct of said Contractor; or because of any claims or amounts recovered from any infringements of patent, trademark, or copyright; or from any claims or amounts arising or recovered under the “Workmen’s Compensation Act,” or any other law, ordinance, order, or decree. Money due the Contractor under and by virtue of his/her contract as may be considered necessary by the Owner for such purpose may be retained for the use of the Owner or, in case no money is due, his/her surety may be held until such suits, actions, or claims for injuries or damages as aforesaid shall have been settled and suitable evidence to that effect furnished to the Owner, except that money due the Contractor will not be withheld when the Contractor produces satisfactory evidence that he is adequately protected by public liability and property damage insurance.

70-12 THIRD PARTY BENEFICIARY CLAUSE. It is specifically agreed between the parties executing the contract that it is not intended by any of the provisions of any part of the contract to create the public or any member thereof a third party beneficiary or to authorize anyone not a party to the contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of the contract.

70-13 OPENING SECTIONS OF THE WORK TO TRAFFIC. Should it be necessary for the Contractor to complete portions of the contract work for the beneficial occupancy of the Owner prior to completion of the entire contract, such "phasing" of the work shall be specified herein and indicated on the plans. When so specified, the Contractor shall complete such portions of the work on or before the date specified or as otherwise specified. The Contractor shall make his/her own estimate of the difficulties involved in arranging his/her work to permit such beneficial occupancy by the Owner as described below:

Phase or Description

Required Date or Sequence of Owner's Beneficial Occupancy

Work Shown on Plan Sheet

Prospective Bidders are directed to Division B.3 Supplemental to Standard Instructions to Respondents.

Upon completion of any portion of the work listed above, such portion shall be accepted by the Owner in accordance with the subsection titled PARTIAL ACCEPTANCE of Section 50.

No portion of the work may be opened by the Contractor for public use until ordered by the Engineer in writing. Should it become necessary to open a portion of the work to public traffic on a temporary or intermittent basis, such openings shall be made when, in the opinion of the Engineer, such portion of the work is in an acceptable condition to support the intended traffic. Temporary or intermittent openings are considered to be inherent in the work and shall not constitute either acceptance of the portion of the work so opened or a waiver of any provision of the contract. Any damage to the portion of the work so opened that is not attributable to traffic which is permitted by the Owner shall be repaired by the Contractor at his/her expense.

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

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

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

70-14 CONTRACTOR'S RESPONSIBILITY FOR WORK. Until the Engineer's final written acceptance of the entire completed work, excepting only those portions of the work accepted in accordance with the subsection titled PARTIAL ACCEPTANCE of Section 50, the Contractor shall have the charge and care thereof and shall take every precaution against injury or damage to any part due to the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work occasioned by any of the above causes before final acceptance and shall bear the expense thereof except damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God such as earthquake, tidal wave, tornado, hurricane or other cataclysmic phenomenon of nature, or acts of the public enemy or of government authorities.

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

70-15 CONTRACTOR'S RESPONSIBILITY FOR UTILITY SERVICE AND FACILITIES OF OTHERS. As provided in the subsection titled RESTORATION OF SURFACES DISTURBED BY OTHERS of this section, the Contractor shall cooperate with the owner of any public or private utility service, FAA or NOAA, or a utility service of another government agency that may be authorized by the owner to construct, reconstruct or maintain such utility services or facilities during the progress of the work. In addition, the Contractor shall control his/her operations to prevent the unscheduled interruption of such utility services and facilities.

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

Federal Aviation Administration
Coordinate through Owner's Project Manager

City of San Antonio Aviation Department
Coordinate through Owner's Project Manager

San Antonio Water System
Coordinate directly with Utility

City Public Service Energy
Coordinate directly with Utility

AT&T
Coordinate directly with Utility

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

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

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

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

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

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

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

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

70-15.1 FAA FACILITIES AND CABLE RUNS. The Contractor is hereby advised that the construction limits of the project include existing facilities and buried cable runs that are owned, operated and maintained by the FAA. The Contractor, during the prosecution of the project work, shall comply with the following:

a. The Contractor shall permit FAA maintenance personnel the right of access to the project work site for purposes of inspecting and maintaining all existing FAA owned facilities.

b. The Contractor shall notify the above named FAA Airway Facilities Point-of-Contact seven (7) calendar days prior to commencement of construction activities in order to permit sufficient time to locate and mark existing buried cables and to schedule any required facility outages.

c. If prosecution of the project work requires a facility outage, the Contractor shall contact the above named FAA Point-of-Contact a minimum of 48 hours prior to the time of the required outage.

d. If prosecution of the project work results in damages to existing FAA equipment or cables, the Contractor shall repair the damaged item in conformance with FAA Airway Facilities' standards to the satisfaction of the above named FAA Point-of-Contact.

e. If the project work requires the cutting or splicing of FAA owned cables, the above named FAA Point-of-Contact shall be contacted a minimum of 48 hours prior to the time the cable work commences. The FAA reserves the right to have a FAA Airway Facilities representative on site to observe the splicing of the cables as a condition of acceptance. All cable splices are to be accomplished in accordance with FAA Airway Facilities' specifications and require approval by the above named FAA Point-of-Contact as a condition of acceptance by the Owner. The Contractor is hereby advised that FAA Airway Facilities restricts the location of where splices may be installed. If a cable splice is required in a location that is not permitted by FAA Airway Facilities, the Contractor shall furnish and install a sufficient length of new cable that eliminates the need for any splice.

70-16 FURNISHING RIGHTS-OF-WAY. The Owner will be responsible for furnishing all rights-of-way upon which the work is to be constructed in advance of the Contractor's operations.

70-17 PERSONAL LIABILITY OF PUBLIC OFFICIALS. In carrying out any of the contract provisions or in exercising any power or authority granted to him by this contract, there shall be no liability upon the Engineer, his/her authorized representatives, or any officials of the Owner either personally or as an official of the Owner. It is understood that in such matters they act solely as agents and representatives of the Owner.

70-18 NO WAIVER OF LEGAL RIGHTS. Upon completion of the work, the Owner will expeditiously make final inspection and notify the Contractor of final acceptance. Such final acceptance, however, shall not preclude or stop the Owner from correcting any measurement, estimate, or certificate made before or after completion of the work, nor shall the Owner be precluded or stopped from recovering from the Contractor or his/her surety, or both, such overpayment as may be sustained, or by failure on the part of the Contractor to fulfill his/her obligations under the contract. A waiver on the part of the Owner of any breach of any part of the contract shall not be held to be a waiver of any other or subsequent breach.

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

70-19 ENVIRONMENTAL PROTECTION. The Contractor shall comply with all Federal, state, and local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

70-20 ARCHAEOLOGICAL AND HISTORICAL FINDINGS. Unless otherwise specified in this subsection, the Contractor is advised that the site of the work is not within any property, district, or site, and does not contain any building, structure, or object listed in the current National Register of Historic Places published by the United States Department of Interior.

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

Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra work, such shall be covered by an appropriate contract modification (change order or supplemental agreement) as provided in the subsection titled EXTRA WORK of Section 40 and the subsection titled PAYMENT FOR EXTRA WORK AND FORCE ACCOUNT WORK of Section 90. If appropriate, the contract modification shall include an extension of contract time in accordance with the subsection titled DETERMINATION AND EXTENSION OF CONTRACT TIME of Section 80.

END OF SECTION 70

Section 80

Prosecution and Progress

80-01 SUBLETTING OF CONTRACT. The Owner will not recognize any subcontractor on the work. The Contractor shall at all times when work is in progress be represented either in person, by a qualified superintendent, or by other designated, qualified representative who is duly authorized to receive and execute orders of the Engineer.

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

The Contractor shall perform, with his organization, an amount of work equal to at least 25 percent of the total contract cost.

80-02 NOTICE TO PROCEED. The notice to proceed shall state the date on which it is expected the Contractor will begin the construction and from which date contract time will be charged. The Contractor shall begin the work to be performed under the contract within 10 days of the date set by the Engineer in the written notice to proceed, but in any event, the Contractor shall notify the Engineer at least 24 hours in advance of the time actual construction operations will begin.

80-03 PROSECUTION AND PROGRESS. Unless otherwise specified, the Contractor shall submit his/her progress schedule for the Engineer's approval within 10 days after the effective date of the notice to proceed. The Contractor's progress schedule, when approved by the Engineer, may be used to establish major construction operations and to check on the progress of the work. The Contractor shall provide sufficient materials, equipment, and labor to guarantee the completion of the project in accordance with the plans and specifications within the time set forth in the proposal.

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

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

80-04 LIMITATION OF OPERATIONS. The Contractor shall control his/her operations and the operations of his/her subcontractors and all suppliers so as to provide for the free and unobstructed movement of aircraft in the AIR OPERATIONS AREAS (AOA) of the airport.

When the work requires the Contractor to conduct his/her operations within an AOA of the airport, the work shall be coordinated with airport operations (through the Engineer) at least 48 hours prior to commencement of such work. The Contractor shall not close an AOA until so authorized by the Engineer and until the necessary temporary marking and associated lighting is in place as provided in the subsection titled BARRICADES, WARNING SIGNS, AND HAZARD MARKINGS of Section 70.

When the contract work requires the Contractor to work within an AOA of the airport on an intermittent basis (intermittent opening and closing of the AOA), the Contractor shall maintain constant communications as hereinafter specified; immediately obey all instructions to vacate the AOA; immediately obey all instructions to resume work in such AOA. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the

AOA until the satisfactory conditions are provided. The following AOA cannot be closed to operating aircraft to permit the Contractor's operations on a continuous basis and will therefore be closed to aircraft operations intermittently as follows:

AOA construction operations shall be at the sole discretion of the Department of Aviation, Airport Operations Division and the local FAA Tower Manager.

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

80-04.1 OPERATIONAL SAFETY ON AIRPORT DURING CONSTRUCTION. All Contractors' operations shall be conducted in accordance with the project safety plan and the provisions set forth within the current version of Advisory Circular 150/5370-2. The safety plan included within the contract documents conveys minimum requirements for operational safety on the airport during construction activities. The Contractor shall prepare and submit a plan that details how it proposes to comply with the requirements presented within the safety plan.

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

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

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

80-05 CHARACTER OF WORKERS, METHODS, AND EQUIPMENT. The Contractor shall, at all times, employ sufficient labor and equipment for prosecuting the work to full completion in the manner and time required by the contract, plans, and specifications.

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

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

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

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

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

When the contract specifies the use of certain methods and equipment, such methods and equipment shall be used unless others are authorized by the Engineer. If the Contractor desires to use a method or type of

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

80-06 TEMPORARY SUSPENSION OF THE WORK. The Owner shall have the authority to suspend the work wholly, or in part, for such period or periods as he may deem necessary, due to unsuitable weather, or such other conditions as are considered unfavorable for the prosecution of the work, or for such time as is necessary due to the failure on the part of the Contractor to carry out orders given or perform any or all provisions of the contract.

In the event that the Contractor is ordered by the Owner, in writing, to suspend work for some unforeseen cause not otherwise provided for in the contract and over which the Contractor has no control, the Contractor may be reimbursed for actual money expended on the work during the period of shutdown. No allowance will be made for anticipated profits. The period of shutdown shall be computed from the effective date of the Engineer's order to suspend work to the effective date of the Engineer's order to resume the work. Claims for such compensation shall be filed with the Engineer within the time period stated in the Engineer's order to resume work. The Contractor shall submit with his/her claim information substantiating the amount shown on the claim. The Engineer will forward the Contractor's claim to the Owner for consideration in accordance with local laws or ordinances. No provision of this article shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspensions made at the request of the Owner, or for any other delay provided for in the contract, plans, or specifications.

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

80-07 DETERMINATION AND EXTENSION OF CONTRACT TIME. The number of calendar or working days allowed for completion of the work shall be stated in the proposal and contract and shall be known as the CONTRACT TIME.

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

a. CONTRACT TIME based on WORKING DAYS shall be calculated weekly by the Engineer. The Engineer will furnish the Contractor a copy of his/her weekly statement of the number of working days charged against the contract time during the week and the number of working days currently specified for completion of the contract (the original contract time plus the number of working days, if any, that have been included in approved CHANGE ORDERS or SUPPLEMENTAL AGREEMENTS covering EXTRA WORK).

The Engineer shall base his/her weekly statement of contract time charged on the following considerations:

(1) No time shall be charged for days on which the Contractor is unable to proceed with the principal item of work under construction at the time for at least 6 hours with the normal work force employed on such principal item. Should the normal work force be on a double-shift, 12 hours shall be used. Should the normal work force be on a triple-shift, 18 hours shall apply. Conditions beyond the Contractor's control such as strikes, lockouts, unusual delays in transportation, temporary suspension of the principal item of work under construction or temporary suspension of the entire work which have been ordered by the Owner for reasons not the fault of the Contractor, shall not be charged against the contract time.

(2) The Engineer will not make charges against the contract time prior to the effective date of the notice to proceed.

(3) The Engineer will begin charges against the contract time on the first working day after the effective date of the notice to proceed.

(4) The Engineer will not make charges against the contract time after the date of final acceptance as defined in the subsection titled FINAL ACCEPTANCE of Section 50.

(5) The Contractor will be allowed 1 week in which to file a written protest setting forth his/her objections to the Engineer's weekly statement. If no objection is filed within such specified time, the weekly statement shall be considered as acceptable to the Contractor.

The contract time (stated in the proposal) is based on the originally estimated quantities as described in the subsection titled INTERPRETATION OF ESTIMATED PROPOSAL QUANTITIES of Section 20. Should the satisfactory completion of the contract require performance of work in greater quantities than those estimated in the proposal, the contract time shall be increased in the same proportion as the cost of the actually completed quantities bears to the cost of the originally estimated quantities in the proposal. Such increase in contract time shall not consider either the cost of work or the extension of contract time that has been covered by change order or supplemental agreement and shall be made at the time of final payment.

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

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

c. When the contract time is a specified completion date, it shall be the date on which all contract work shall be substantially completed.

If the Contractor finds it impossible for reasons beyond his/her control to complete the work within the contract time as specified, or as extended in accordance with the provisions of this subsection, he may, at any time prior to the expiration of the contract time as extended, make a written request to the Engineer for an extension of time setting forth the reasons which he believes will justify the granting of his/her request. Requests for extension of time on calendar day projects, caused by inclement weather, shall be supported with National Weather Bureau data showing the actual amount of inclement weather exceeded which could normally be expected during the contract period. The Contractor's plea that insufficient time was specified is not a valid reason for extension of time. If the Engineer finds that the work was delayed because of conditions beyond the control and without the fault of the Contractor, he may extend the time

for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect, the same as though it were the original time for completion.

80-08 FAILURE TO COMPLETE ON TIME. For each calendar day or working day, as specified in the contract, that any work remains uncompleted after the contract time (including all extensions and adjustments as provided in the subsection titled DETERMINATION AND EXTENSION OF CONTRACT TIME of this Section) the sum specified in the contract and proposal as liquidated damages will be deducted from any money due or to become due the Contractor or his/her surety. Such deducted sums shall not be deducted as a penalty but shall be considered as liquidation of a reasonable portion of damages including but not limited to additional engineering services that will be incurred by the Owner should the Contractor fail to complete the work in the time provided in his/her contract.

Prospective Bidders are directed to the City of San Antonio Specification 060 Supplemental Conditions and Division B.1.: Calendar – Day Contract.

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

80-09 DEFAULT AND TERMINATION OF CONTRACT. The Contractor shall be considered in default of his/her contract and such default will be considered as cause for the Owner to terminate the contract for any of the following reasons if the Contractor:

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

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

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

d. Discontinues the prosecution of the work, or

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

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

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

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

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

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

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

All costs and charges incurred by the Owner, together with the cost of completing the work under contract, will be deducted from any monies due or which may become due the Contractor. If such

expense exceeds the sum which would have been payable under the contract, then the Contractor and the surety shall be liable and shall pay to the Owner the amount of such excess.

80-10 TERMINATION FOR NATIONAL EMERGENCIES. The Owner shall terminate the contract or portion thereof by written notice when the Contractor is prevented from proceeding with the construction contract as a direct result of an Executive Order of the President with respect to the prosecution of war or in the interest of national defense.

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

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

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

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

80-11 WORK AREA, STORAGE AREA AND SEQUENCE OF OPERATIONS. The Contractor shall obtain approval from the Engineer prior to beginning any work in all areas of the airport. No operating runway, taxiway, or Air Operations Area (AOA) shall be crossed, entered, or obstructed while it is operational. The Contractor shall plan and coordinate his/her work in such a manner as to insure safety and a minimum of hindrance to flight operations. All Contractor equipment and material stockpiles shall be stored a minimum or [ ] feet from the centerline of an active runway. No equipment will be allowed to park within the approach area of an active runway at any time. No equipment shall be within [ ] feet of an active runway at any time.

END OF SECTION 80

Section 90

Measurement and Payment

90-01 MEASUREMENT OF QUANTITIES. All work completed under the contract will be measured by the Engineer, or his/her authorized representatives, using United States Customary Units of Measurement or the International System of Units.

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

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

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

Unless otherwise specified, all contract items which are measured by the linear foot such as electrical ducts, conduits, pipe culverts, underdrains, and similar items shall be measured parallel to the base or foundation upon which such items are placed.

In computing volumes of excavation the average end area method or other acceptable methods will be used.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning or payment, shall be included in the unit contract prices for the various items of the project.

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

90-02 SCOPE OF PAYMENT. The Contractor shall receive and accept compensation provided for in the contract as full payment for furnishing all materials, for performing all work under the contract in a complete and acceptable manner, and for all risk, loss, damage, or expense of whatever character arising out of the nature of the work or the prosecution thereof, subject to the provisions of the subsection titled NO WAIVER OF LEGAL RIGHTS of Section 70.

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

90-03 COMPENSATION FOR ALTERED QUANTITIES. When the accepted quantities of work vary from the quantities in the proposal, the Contractor shall accept as payment in full, so far as contract items are concerned, payment at the original contract price for the accepted quantities of work actually completed and accepted. No allowance, except as provided for in the subsection titled ALTERATION OF WORK AND QUANTITIES of Section 40 will be made for any increased expense, loss of expected reimbursement, or loss of anticipated profits suffered or claimed by the Contractor which results directly from such alterations or indirectly from his/her unbalanced allocation of overhead and profit among the contract items, or from any other cause.

90-04 PAYMENT FOR OMITTED ITEMS. As specified in the subsection titled OMITTED ITEMS of Section 40, the Engineer shall have the right to omit from the work (order nonperformance) any contract item, except major contract items, in the best interest of the Owner.

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

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

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

90-05 PAYMENT FOR EXTRA AND FORCE ACCOUNT WORK. Extra work, performed in accordance with the subsection titled EXTRA WORK of Section 40, will be paid for at the contract prices or agreed prices specified in the change order or supplemental agreement authorizing the extra work. When the change order or supplemental agreement authorizing the extra work requires that it be done by

force account, such force account shall be measured and paid for based on expended labor, equipment, and materials plus a negotiated and agreed upon allowance for overhead and profit.

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

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

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

(1) Name, classification, date, daily hours, total hours, rate and extension for each laborer and foreman.

(2) Designation, dates, daily hours, total hours, rental rate, and extension for each unit of machinery and equipment.

(3) Quantities of materials, prices, and extensions.

(4) Transportation of materials.

(5) Cost of property damage, liability and workman's compensation insurance premiums, unemployment insurance contributions, and social security tax.

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

90-06 PARTIAL PAYMENTS. Partial payments will be made to the Contractor at least once each month as the work progresses. Said payments will be based upon estimates, prepared by the Engineer, of the value of the work performed and materials complete and in place in accordance with the contract, plans, and specifications. Such partial payments may also include the delivered actual cost of those materials stockpiled and stored in accordance with the subsection titled PAYMENT FOR MATERIALS ON HAND of this section. No partial payment will be made when the amount due to the Contractor since the last estimate amounts to less than five hundred dollars.

Prospective Bidders are directed to the City of San Antonio Section 085, General Conditions for the City of San Antonio, Heavy/Highway Construction Contracts, Article 9, Payment and Completion, for all subjects related to retainage.

The Contractor is required to pay all subcontractors for satisfactory performance of their contracts no later than 30 days after the Contractor has received a partial payment. A subcontractor's work is satisfactorily completed when all the tasks called for in the subcontract have been accomplished and documented as required by the Owner. When the Owner has made an incremental acceptance of a portion of a prime contract, the work of a subcontractor covered by that acceptance is deemed to be satisfactorily completed.

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

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

The Contractor shall deliver to the Owner a complete release of all claims for labor and material arising out of this contract before the final payment is made. If any subcontractor or supplier fails to furnish such a release in full, the Contractor may furnish a bond or other collateral satisfactory to the Owner to indemnify the Owner against any potential lien or other such claim. The bond or collateral shall include all costs, expenses, and attorney fees the Owner may be compelled to pay in discharging any such lien or claim.

90-07 PAYMENT FOR MATERIALS ON HAND. Partial payments may be made to the extent of the delivered cost of materials to be incorporated in the work, provided that such materials meet the requirements of the contract, plans, and specifications and are delivered to acceptable sites on the airport property or at other sites in the vicinity that are acceptable to the Owner. Such delivered costs of stored or stockpiled materials may be included in the next partial payment after the following conditions are met:

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

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

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

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

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

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

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

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

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

90-08 PAYMENT OF WITHHELD FUNDS. At the Contractor's option, if an Owner withholds retainage in accordance with the methods described in subsection 90-06 PARTIAL PAYMENTS, the Contractor may request that the Owner deposit the retainage into an escrow account. The Owner's deposit of retainage into an escrow account is subject to the following conditions:

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

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

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

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

90-09 ACCEPTANCE AND FINAL PAYMENT. When the contract work has been accepted in accordance with the requirements of the subsection titled FINAL ACCEPTANCE of Section 50, the Engineer will prepare the final estimate of the items of work actually performed. The Contractor shall approve the Engineer's final estimate or advise the Engineer of his/her objections to the final estimate which are based on disputes in measurements or computations of the final quantities to be paid under the contract as amended by change order or supplemental agreement. The Contractor and the Engineer shall resolve all disputes (if any) in the measurement and computation of final quantities to be paid within 30 calendar days of the Contractor's receipt of the Engineer's final estimate. If, after such 30-day period, a dispute still exists, the Contractor may approve the Engineer's estimate under protest of the quantities in dispute, and such disputed quantities shall be considered by the Owner as a claim in accordance with the subsection titled CLAIMS FOR ADJUSTMENT AND DISPUTES of Section 50.

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

If the Contractor has filed a claim for additional compensation under the provisions of the subsection titled CLAIMS FOR ADJUSTMENTS AND DISPUTES of Section 50 or under the provisions of this subsection, such claims will be considered by the Owner in accordance with local laws or ordinances. Upon final adjudication of such claims, any additional payment determined to be due the Contractor will be paid pursuant to a supplemental final estimate.

END OF SECTION 90

Section 100

Contractor Quality Control Program

100-01 GENERAL. When the specification requires a Contractor Quality Control Program, the Contractor shall establish, provide, and maintain an effective Quality Control Program that details the methods and procedures that will be taken to assure that all materials and completed construction required by this contract conform to contract plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

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

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

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

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

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

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

100-02 DESCRIPTION OF PROGRAM.

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

b. Quality Control Program. The Contractor shall describe the Quality Control Program in a written document that shall be reviewed by the Engineer prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Engineer for review at least **15** calendar days before the **Pre-Construction Conference**.

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

a. Quality control organization

b. Project progress schedule

c. Submittals schedule

d. Inspection requirements

e. Quality control testing plan

f. Documentation of quality control activities

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

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

100-03 QUALITY CONTROL ORGANIZATION. The Contractor Quality Control Program shall be implemented by the establishment of a separate quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, including inspection and testing for each item of work. If necessary, different technicians can be used for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the Quality Control Program, the personnel assigned shall be subject to the qualification requirements of paragraph 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

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

a. Program Administrator. The Program Administrator shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall have a minimum of 5 years of experience in airport and/or highway construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

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

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

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

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

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

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

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

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

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

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

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

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by Section 100-06.

(2) Performance of all quality control tests as required by the technical specifications and Section 100-07.

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

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

100-04 PROJECT PROGRESS SCHEDULE. The Contractor shall submit a coordinated construction schedule for all work activities. The schedule shall be prepared as a network diagram in Critical Path Method (CPM), PERT, or other format, or as otherwise specified in the contract. As a minimum, it shall provide information on the sequence of work activities, milestone dates, and activity duration.

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

100-05 SUBMITTALS SCHEDULE. The Contractor shall submit a detailed listing of all submittals (for example, mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include:

a. Specification item number

b. Item description

c. Description of submittal

d. Specification paragraph requiring submittal

e. Scheduled date of submittal

100-06 INSPECTION REQUIREMENTS. Quality control inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by Section 100-07.

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

a. During plant operation for material production, quality control test results and periodic inspections shall be used to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment used in proportioning and mixing shall be inspected to ensure its proper operating condition. The Quality Control Program shall detail how these and other quality control functions will be accomplished and used.

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

100-07 QUALITY CONTROL TESTING PLAN. As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by each technical specification Item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

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

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

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

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

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

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

f. Responsibility (for example, plant technician)

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

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

All quality control test results shall be documented by the Contractor as required by Section 100-08.

100-08 DOCUMENTATION. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

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

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

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

(1) Technical specification item number and description;

(2) Compliance with approved submittals;

(3) Proper storage of materials and equipment;

(4) Proper operation of all equipment;

(5) Adherence to plans and technical specifications;

(6) Review of quality control tests; and

(7) Safety inspection.

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

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

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

(1) Technical specification item number and description

(2) Test designation

(3) Location

(4) Date of test

(5) Control requirements

(6) Test results

(7) Causes for rejection

(8) Recommended remedial actions

(9) Retests

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

100-09 CORRECTIVE ACTION REQUIREMENTS. The Quality Control Program shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

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

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

100-10 SURVEILLANCE BY THE ENGINEER. All items of material and equipment shall be subject to surveillance by the Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate quality control system in conformance with the requirements detailed herein and the applicable technical specifications and plans. In addition, all items of materials, equipment and work in place shall be subject to surveillance by the Engineer at the site for the same purpose.

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

100-11 NONCOMPLIANCE.

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

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

(1) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.

(2) Order the Contractor to stop operations until appropriate corrective actions are taken.

END OF SECTION 100

Section 110 Method of Estimating Percentage of Material within Specification Limits (PWL)

110-01 GENERAL. When the specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined in accordance with this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (S_n) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index, Q_L for Lower Quality Index and/or Q_U for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. All specification limits specified in the technical sections shall be absolute values. Test results used in the calculations shall be to the significant figure given in the test procedure.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Owner's risk is the probability that material produced at the rejectable quality level is accepted.

It is the intent of this section to inform the contractor that, in order to consistently offset the contractor's risk for material evaluated, production quality (using population average and population standard deviation) must be maintained at the acceptable quality specified or higher. In all cases, it is the responsibility of the contractor to produce at quality levels that will meet the specified acceptance criteria when sampled and tested at the frequencies specified.

110-02 METHOD FOR COMPUTING PWL. The computational sequence for computing PWL is as follows:

a. Divide the lot into n sublots in accordance with the acceptance requirements of the specification.

b. Locate the random sampling position within the sublot in accordance with the requirements of the specification.

c. Make a measurement at each location, or take a test portion and make the measurement on the test portion in accordance with the testing requirements of the specification.

d. Find the sample average (X) for all sublot values within the lot by using the following formula:

$$X = (x_1 + x_2 + x_3 + \ldots x_n) / n$$

Where: X = Sample average of all sublot values within a lot

x_1, x_2 = Individual sublot values

n = Number of sublots

e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \ldots d_n^2)/(n-1)]^{1/2}$$

Where: S_n = Sample standard deviation of the number of sublot values in the set

d_1, d_2 = Deviations of the individual sublot values x_1, x_2, … from the average value X

that is: $d_1 = (x_1 - X)$, $d_2 = (x_2 - X)$ … $d_n = (x_n - X)$

n = Number of sublots

f. For single sided specification limits (that is, L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_L = (X - L) / S_n$$

Where: L = specification lower tolerance limit

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L, using the column appropriate to the total number (n) of measurements. If the value of Q_L falls between values shown on the table, use the next higher value of PWL.

g. For double-sided specification limits (that is, L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n$$
AND
$$Q_U = (U - X) / S_n$$

Where: L and U = specification lower and upper tolerance limits

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U, using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. If the values of Q_L fall between values shown on the table, use the next higher value of P_L or P_U. Determine the PWL by use of the following formula:

$PWL = (P_U + P_L) - 100$

Where: P_L = percent within lower specification limit

P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

Project: Example Project

Test Item: Item P-401, Lot A.

A. PWL Determination for Mat Density.

1. Density of four random cores taken from Lot A.

A-1 = 96.60
A-2 = 97.55
A-3 = 99.30
A-4 = 98.35
n = 4

2. Calculate average density for the lot.

$X = (x_1 + x_2 + x_3 + . . . x_n) / n$
$X = (96.60 + 97.55 + 99.30 + 98.35) / 4$
X = 97.95 percent density

3. Calculate the standard deviation for the lot.

$S_n = [((96.60 - 97.95)^2 + (97.55 - 97.95)^2 + (99.30 - 97.95)^2 + (98.35 - 97.95)^2)) / (4 - 1)]^{1/2}$
$S_n = [(1.82 + 0.16 + 1.82 + 0.16) / 3]^{1/2}$
$S_n = 1.15$

4. Calculate the Lower Quality Index Q_L for the lot. (L=96.3)

$Q_L = (X - L) / S_n$
$Q_L = (97.95 - 96.30) / 1.15$
$Q_L = 1.4348$

5. Determine PWL by entering Table 1 with $Q_L = 1.44$ and n= 4.

PWL = 98

B. PWL Determination for Air Voids.

1. Air Voids of four random samples taken from Lot A.

A-1 = 5.00
A-2 = 3.74
A-3 = 2.30
A-4 = 3.25

2. Calculate the average air voids for the lot.

$X = (x_1 + x_2 + x_3 . . . n) / n$
$X = (5.00 + 3.74 + 2.30 + 3.25) / 4$
X = 3.57 percent

3. Calculate the standard deviation S_n for the lot.

$S_n = [((3.57 - 5.00)^2 + (3.57 - 3.74)^2 + (3.57 - 2.30)^2 + (3.57 -3.25)^2) / (4 - 1)]^{1/2}$

$S_n = [(2.04 + 0.03 + 1.62 + 0.10) / 3]^{1/2}$

$S_n = 1.12$

4. Calculate the Lower Quality Index Q_L for the lot. (L= 2.0)

$Q_L = (X - L) / S_n$

$Q_L = (3.57 - 2.00) / 1.12$

$Q_L = 1.3992$

5. Determine P_L by entering Table 1 with $Q_L = 1.41$ and n = 4.

$P_L = 97$

6. Calculate the Upper Quality Index Q_U for the lot. (U= 5.0)

$Q_U = (U - X) / S_n$

$Q_U = (5.00 - 3.57) / 1.12$

$Q_U = 1.2702$

7. Determine P_U by entering Table 1 with $Q_U = 1.29$ and n = 4.

$P_U = 93$

8. Calculate Air Voids PWL

$PWL = (P_L + P_U) - 100$

$PWL = (97 + 93) - 100 = 90$

EXAMPLE OF OUTLIER CALCULATION (REFERENCE ASTM E 178)

Project: Example Project

Test Item: Item P-401, Lot A.

A. Outlier Determination for Mat Density.

1. Density of four random cores taken from Lot A arranged in descending order.

A-3 = 99.30

A-4 = 98.35

A-2 = 97.55

A-1 = 96.60

2. Use n=4 and upper 5 percent significance level of to find the critical value for test criterion = 1.463.

3. Use average density, standard deviation, and test criterion value to evaluate density measurements.

a. For measurements greater than the average:

If (measurement - average)/(standard deviation) is less than test criterion,
then the measurement is not considered an outlier

For A-3, check if (99.30 - 97.95) / 1.15 is greater than 1.463.

Since 1.174 is less than 1.463, the value is not an outlier.

b. For measurements less than the average:

If (average - measurement)/(standard deviation) is less than test criterion,
then the measurement is not considered an outlier.

For A-1, check if (97.95 - 96.60) / 1.15 is greater than 1.463.

Since 1.435 is less than 1.463, the value is not an outlier.

NOTE: In this example, a measurement would be considered an outlier if the density were:

Greater than (97.95 + 1.463 x 1.15) = 99.63 percent

OR

less than (97.95 - 1.463 x 1.15) = 96.27 percent.

Table 1. Table for Estimating Percent of Lot Within Limits (PWL)

Percent Within Limits (P_L and P_U)	Positive Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
99	1.1541	1.4700	1.6714	1.8008	1.8888	1.9520	1.9994	2.0362
98	1.1524	1.4400	1.6016	1.6982	1.7612	1.8053	1.8379	1.8630
97	1.1496	1.4100	1.5427	1.6181	1.6661	1.6993	1.7235	1.7420
96	1.1456	1.3800	1.4897	1.5497	1.5871	1.6127	1.6313	1.6454
95	1.1405	1.3500	1.4407	1.4887	1.5181	1.5381	1.5525	1.5635
94	1.1342	1.3200	1.3946	1.4329	1.4561	1.4717	1.4829	1.4914
93	1.1269	1.2900	1.3508	1.3810	1.3991	1.4112	1.4199	1.4265
92	1.1184	1.2600	1.3088	1.3323	1.3461	1.3554	1.3620	1.3670
91	1.1089	1.2300	1.2683	1.2860	1.2964	1.3032	1.3081	1.3118
90	1.0982	1.2000	1.2290	1.2419	1.2492	1.2541	1.2576	1.2602
89	1.0864	1.1700	1.1909	1.1995	1.2043	1.2075	1.2098	1.2115
88	1.0736	1.1400	1.1537	1.1587	1.1613	1.1630	1.1643	1.1653
87	1.0597	1.1100	1.1173	1.1192	1.1199	1.1204	1.1208	1.1212
86	1.0448	1.0800	1.0817	1.0808	1.0800	1.0794	1.0791	1.0789
85	1.0288	1.0500	1.0467	1.0435	1.0413	1.0399	1.0389	1.0382
84	1.0119	1.0200	1.0124	1.0071	1.0037	1.0015	1.0000	0.9990
83	0.9939	0.9900	0.9785	0.9715	0.9671	0.9643	0.9624	0.9610
82	0.9749	0.9600	0.9452	0.9367	0.9315	0.9281	0.9258	0.9241
81	0.9550	0.9300	0.9123	0.9025	0.8966	0.8928	0.8901	0.8882
80	0.9342	0.9000	0.8799	0.8690	0.8625	0.8583	0.8554	0.8533
79	0.9124	0.8700	0.8478	0.8360	0.8291	0.8245	0.8214	0.8192
78	0.8897	0.8400	0.8160	0.8036	0.7962	0.7915	0.7882	0.7858
77	0.8662	0.8100	0.7846	0.7716	0.7640	0.7590	0.7556	0.7531
76	0.8417	0.7800	0.7535	0.7401	0.7322	0.7271	0.7236	0.7211
75	0.8165	0.7500	0.7226	0.7089	0.7009	0.6958	0.6922	0.6896
74	0.7904	0.7200	0.6921	0.6781	0.6701	0.6649	0.6613	0.6587
73	0.7636	0.6900	0.6617	0.6477	0.6396	0.6344	0.6308	0.6282
72	0.7360	0.6600	0.6316	0.6176	0.6095	0.6044	0.6008	0.5982
71	0.7077	0.6300	0.6016	0.5878	0.5798	0.5747	0.5712	0.5686
70	0.6787	0.6000	0.5719	0.5582	0.5504	0.5454	0.5419	0.5394
69	0.6490	0.5700	0.5423	0.5290	0.5213	0.5164	0.5130	0.5105
68	0.6187	0.5400	0.5129	0.4999	0.4924	0.4877	0.4844	0.4820
67	0.5878	0.5100	0.4836	0.4710	0.4638	0.4592	0.4560	0.4537
66	0.5563	0.4800	0.4545	0.4424	0.4355	0.4310	0.4280	0.4257
65	0.5242	0.4500	0.4255	0.4139	0.4073	0.4030	0.4001	0.3980
64	0.4916	0.4200	0.3967	0.3856	0.3793	0.3753	0.3725	0.3705
63	0.4586	0.3900	0.3679	0.3575	0.3515	0.3477	0.3451	0.3432
62	0.4251	0.3600	0.3392	0.3295	0.3239	0.3203	0.3179	0.3161
61	0.3911	0.3300	0.3107	0.3016	0.2964	0.2931	0.2908	0.2892
60	0.3568	0.3000	0.2822	0.2738	0.2691	0.2660	0.2639	0.2624
59	0.3222	0.2700	0.2537	0.2461	0.2418	0.2391	0.2372	0.2358
58	0.2872	0.2400	0.2254	0.2186	0.2147	0.2122	0.2105	0.2093
57	0.2519	0.2100	0.1971	0.1911	0.1877	0.1855	0.1840	0.1829
56	0.2164	0.1800	0.1688	0.1636	0.1607	0.1588	0.1575	0.1566
55	0.1806	0.1500	0.1406	0.1363	0.1338	0.1322	0.1312	0.1304
54	0.1447	0.1200	0.1125	0.1090	0.1070	0.1057	0.1049	0.1042
53	0.1087	0.0900	0.0843	0.0817	0.0802	0.0793	0.0786	0.0781
52	0.0725	0.0600	0.0562	0.0544	0.0534	0.0528	0.0524	0.0521
51	0.0363	0.0300	0.0281	0.0272	0.0267	0.0264	0.0262	0.0260
50	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Percent Within Limits (P_L and P_U)	Negative Values of Q (Q_L and Q_U)							
	n=3	n=4	n=5	n=6	n=7	n=8	n=9	n=10
49	-0.0363	-0.0300	-0.0281	-0.0272	-0.0267	-0.0264	-0.0262	-0.0260
48	-0.0725	-0.0600	-0.0562	-0.0544	-0.0534	-0.0528	-0.0524	-0.0521
47	-0.1087	-0.0900	-0.0843	-0.0817	-0.0802	-0.0793	-0.0786	-0.0781
46	-0.1447	-0.1200	-0.1125	-0.1090	-0.1070	-0.1057	-0.1049	-0.1042
45	-0.1806	-0.1500	-0.1406	-0.1363	-0.1338	-0.1322	-0.1312	-0.1304
44	-0.2164	-0.1800	-0.1688	-0.1636	-0.1607	-0.1588	-0.1575	-0.1566
43	-0.2519	-0.2100	-0.1971	-0.1911	-0.1877	-0.1855	-0.1840	-0.1829
42	-0.2872	-0.2400	-0.2254	-0.2186	-0.2147	-0.2122	-0.2105	-0.2093
41	-0.3222	-0.2700	-0.2537	-0.2461	-0.2418	-0.2391	-0.2372	-0.2358
40	-0.3568	-0.3000	-0.2822	-0.2738	-0.2691	-0.2660	-0.2639	-0.2624
39	-0.3911	-0.3300	-0.3107	-0.3016	-0.2964	-0.2931	-0.2908	-0.2892
38	-0.4251	-0.3600	-0.3392	-0.3295	-0.3239	-0.3203	-0.3179	-0.3161
37	-0.4586	-0.3900	-0.3679	-0.3575	-0.3515	-0.3477	-0.3451	-0.3432
36	-0.4916	-0.4200	-0.3967	-0.3856	-0.3793	-0.3753	-0.3725	-0.3705
35	-0.5242	-0.4500	-0.4255	-0.4139	-0.4073	-0.4030	-0.4001	-0.3980
34	-0.5563	-0.4800	-0.4545	-0.4424	-0.4355	-0.4310	-0.4280	-0.4257
33	-0.5878	-0.5100	-0.4836	-0.4710	-0.4638	-0.4592	-0.4560	-0.4537
32	-0.6187	-0.5400	-0.5129	-0.4999	-0.4924	-0.4877	-0.4844	-0.4820
31	-0.6490	-0.5700	-0.5423	-0.5290	-0.5213	-0.5164	-0.5130	-0.5105
30	-0.6787	-0.6000	-0.5719	-0.5582	-0.5504	-0.5454	-0.5419	-0.5394
29	-0.7077	-0.6300	-0.6016	-0.5878	-0.5798	-0.5747	-0.5712	-0.5686
28	-0.7360	-0.6600	-0.6316	-0.6176	-0.6095	-0.6044	-0.6008	-0.5982
27	-0.7636	-0.6900	-0.6617	-0.6477	-0.6396	-0.6344	-0.6308	-0.6282
26	-0.7904	-0.7200	-0.6921	-0.6781	-0.6701	-0.6649	-0.6613	-0.6587
25	-0.8165	-0.7500	-0.7226	-0.7089	-0.7009	-0.6958	-0.6922	-0.6896
24	-0.8417	-0.7800	-0.7535	-0.7401	-0.7322	-0.7271	-0.7236	-0.7211
23	-0.8662	-0.8100	-0.7846	-0.7716	-0.7640	-0.7590	-0.7556	-0.7531
22	-0.8897	-0.8400	-0.8160	-0.8036	-0.7962	-0.7915	-0.7882	-0.7858
21	-0.9124	-0.8700	-0.8478	-0.8360	-0.8291	-0.8245	-0.8214	-0.8192
20	-0.9342	-0.9000	-0.8799	-0.8690	-0.8625	-0.8583	-0.8554	-0.8533
19	-0.9550	-0.9300	-0.9123	-0.9025	-0.8966	-0.8928	-0.8901	-0.8882
18	-0.9749	-0.9600	-0.9452	-0.9367	-0.9315	-0.9281	-0.9258	-0.9241
17	-0.9939	-0.9900	-0.9785	-0.9715	-0.9671	-0.9643	-0.9624	-0.9610
16	-1.0119	-1.0200	-1.0124	-1.0071	-1.0037	-1.0015	-1.0000	-0.9990
15	-1.0288	-1.0500	-1.0467	-1.0435	-1.0413	-1.0399	-1.0389	-1.0382
14	-1.0448	-1.0800	-1.0817	-1.0808	-1.0800	-1.0794	-1.0791	-1.0789
13	-1.0597	-1.1100	-1.1173	-1.1192	-1.1199	-1.1204	-1.1208	-1.1212
12	-1.0736	-1.1400	-1.1537	-1.1587	-1.1613	-1.1630	-1.1643	-1.1653
11	-1.0864	-1.1700	-1.1909	-1.1995	-1.2043	-1.2075	-1.2098	-1.2115
10	-1.0982	-1.2000	-1.2290	-1.2419	-1.2492	-1.2541	-1.2576	-1.2602
9	-1.1089	-1.2300	-1.2683	-1.2860	-1.2964	-1.3032	-1.3081	-1.3118
8	-1.1184	-1.2600	-1.3088	-1.3323	-1.3461	-1.3554	-1.3620	-1.3670
7	-1.1269	-1.2900	-1.3508	-1.3810	-1.3991	-1.4112	-1.4199	-1.4265
6	-1.1342	-1.3200	-1.3946	-1.4329	-1.4561	-1.4717	-1.4829	-1.4914
5	-1.1405	-1.3500	-1.4407	-1.4887	-1.5181	-1.5381	-1.5525	-1.5635
4	-1.1456	-1.3800	-1.4897	-1.5497	-1.5871	-1.6127	-1.6313	-1.6454
3	-1.1496	-1.4100	-1.5427	-1.6181	-1.6661	-1.6993	-1.7235	-1.7420
2	-1.1524	-1.4400	-1.6016	-1.6982	-1.7612	-1.8053	-1.8379	-1.8630
1	-1.1541	-1.4700	-1.6714	-1.8008	-1.8888	-1.9520	-1.9994	-2.0362

END OF SECTION 110

Section 120

Nuclear Gauges

120-01 TESTING. When the specifications provide for nuclear gauge acceptance testing of material for Items P-152, P-154, P-208, and P-209, the testing shall be performed in accordance with this section. At each sampling location, the field density shall be determined in accordance with ASTM D 6938 using the Direct Transmission Method. The nuclear gauge shall be calibrated in accordance with ASTM D 6938. Calibration and operation of the gauge shall be in accordance with the requirements of the manufacturer. The operator of the nuclear gauge must show evidence of training and experience in the use of the instrument. The gauge shall be standardized daily in accordance with ASTM standards.

When using the nuclear method, ASTM D 6938 shall be used to determine the moisture content of the material. The calibration curve furnished with the nuclear gauges shall be checked in accordance with ASTM standards. The calibration checks shall be made at the beginning of a job and at regular daily intervals.

gauge

The material shall be accepted on a lot basis. Each Lot shall be divided into eight (8) sublots when ASTM D 6938 is used.

120-02. When PWL concepts are incorporated, compaction shall continue until a PWL of 90 percent or more is achieved using the lower specification tolerance limits (L) below.

The percentage of material within specification limits (PWL) shall be determined in accordance with the procedures specified in Section 110 of the General Provisions.

The lower specification tolerance limit (L) for density shall be:

Specification Item Number	Specification Tolerance (L) for Density, (percent of laboratory maximum)
Item P-152	90.5 for cohesive material, 95.5 for non-cohesive
Item P-154	95.5
Item P-208	97.0
Item P-209	97.0

If the PWL is less than 90 percent, the lot shall be reworked and recompacted by the Contractor at the Contractor's expense. After reworking and recompaction, the lot shall be resampled and retested. Retest results for the lot shall be reevaluated for acceptance. This procedure shall continue until the PWL is 90 percent or greater.

120-03 VERIFICATION TESTING. (For Items P-152 and P-154 only.) The Engineer will verify the maximum laboratory density of material placed in the field for each lot. A minimum of one test will be made for each lot of material at the site. The verification process will consist of; (1) compacting the material and determining the dry density and moisture-density in accordance with [ASTM D 698 for aircraft gross weights less than 60,0000 pounds] [ASTM D 1557 for aircraft gross weights 60,000 pounds or more], and (2) comparing the result with the laboratory moisture-density curves for the material being placed. This verification process is commonly referred to as a "one-point Proctor".

If the material does not conform to the existing moisture-density curves, the Engineer will establish the laboratory maximum density and optimum moisture content for the material in accordance with [ASTM

D 698 for aircraft gross weights less than 60,0000 pounds] [ASTM D 1557 for aircraft gross weights 60,000 pounds or more].

Additional verification tests will be made, if necessary, to properly classify all materials placed in the lot.

The percent compaction of each sampling location will be determined by dividing the field density of each sublot by the laboratory maximum density for the lot.

END OF SECTION 120

Modification
Section 150-Temporary Facilities, Project Controls and Safety

Paragraph 150-02.02(C)- Field Office and Sheds.

The Contractor shall furnish a minimum 300 s.f. office with air conditioning and heating, telephone and convenient access to a restroom nearby for the Resident Project Inspector's use during the course of the work. Field office shall be divided to provide a separate room set aside for storage of concrete test specimens and for other testing equipment, material certifications and samples. Furnishing shall include one office desk, two chairs, a drafting table and drafting stool and specimen curing tanks in sufficient size and number to contain the maximum number of test beams anticipated. Tanks shall be provided with thermostatically controlled meters to insure the water temperature is maintained at the prescribed temperatures stated in Item P-501. All costs will be paid by the Contractor and the office and furnishing will remain the property of the Contractor upon completion of the project.

February 16, 1999

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PART II

TECHNICAL SPECIFICATIONS

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PART II – TECHNICAL SPECIFICATIONS

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CIVIL SPECIFICATIONS

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ITEM P-100 CONTRACTOR QUALITY CONTROL

DESCRIPTION

100-1.1 This item shall consist of all work necessary to ensure quality control of the Contractor's work during construction as called on the Plans and in accordance with General Provisions, Section 100.

The Contractor shall be responsible to conduct all Quality Control Testing and Inspection as indicated in the Technical Specifications for each item, as well as any other test not specifically listed, but necessary to control the work to the satisfaction of the Engineer. The Engineer's Quality Assurance test results will be made available to the Contractor upon request. The Contractor shall not depend on the Engineer's Quality Assurance for the Contractor's Quality Control Program.

The Contractor shall submit his plan for Quality Control Testing and Inspection as required in General Provisions, Section 100, for review and approval to the Engineer at least five (5) working days prior to the pre-construction meeting.

METHOD OF MEASUREMENT

100-2.1 General. Measurement for Contractor Quality Control to be paid for will be determined by the lump sum unit price.

a. Required Documentation. The Contractor shall document the date, name of individual, job title of individual, time work started and ended, times when the individual leaves the Air Operations Areas, and the total number of hours worked. When the Contractor's Quality Control personnel leave the Air Operations Area, this time shall be documented but not measured. The Contractor shall utilize a time clock for verification of time worked for each employee and this documentation shall become a part of the Program Administrator's daily and nightly Quality Control Report.

b. Computations for Contractor Monthly Pay Application. Monthly progress payments will be calculated by dividing the lump sum unit price by the contract time in months.

c. Travel Time. Travel time to and from the project site shall not be measured. When the Contractor's Quality Control personnel leave the project site to pick up supplies, materials, equipment or deliver samples, etc., this time shall be documented and reported, however, this time will not be measured for payment. All such travel time shall be considered incidental to the Mobilization/ Demobilization item.

BASIS OF PAYMENT

100-3.1 Contractor Quality Control shall be paid for at the lump sum price for the base bid and each additive alternate bid. This lump sum price shall constitute full compensation for furnishing all technicians, inspectors, testing equipment field vehicles.

Payment shall be made under:

P-100-2.1 Contractor Quality Control – per Lump Sum

END OF ITEM P-100

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Item P-101 Surface Preparation

DESCRIPTION

101-1.1 This item shall consist of preparation of existing pavement surfaces for overlay, removal of existing pavement, and other miscellaneous items. The work shall be accomplished in accordance with these specifications and the applicable drawings.

EQUIPMENT

101-2.1 All equipment shall be specified hereinafter or as approved by the Engineer. The equipment shall not cause damage to the pavement to remain in place.

CONSTRUCTION

101-3.1 REMOVAL OF EXISTING PAVEMENT

a. Concrete: The existing concrete to be removed shall be freed from the pavement to remain unless jackhammers are used for the complete removal. This shall be accomplished by line drilling or sawing through the complete depth of the slab 1 ft. inside the perimeter of the final removal limits or outside the load transfer devices, whichever is greater. In this case, the limits of removal would be located on joints. If line drilling is used, the distance between holes shall not exceed the diameter of the hole. The pavement between the perimeter of the pavement removal and the saw cut or line-drilled holes shall be removed with a jackhammer. Where the perimeter of the removal limits is not located on the joint, the perimeter shall be saw cut 2 in in depth or 1/4 the slab thickness, whichever is less. Again, the concrete shall be line drilled or saw cut the full depth of the pavement 6 in inside the removal limits. The pavement inside the saw cut or line shall be broken by methods suitable to the Contractor; however, if the material is to be wasted on the airport site, it shall be reduced to a maximum size designated by the airport owner. The Contractor's removal operation shall not cause damage to cables, utility ducts, pipelines, or drainage structures under the pavement. Any damage shall be repaired by the Contractor at no expense to the airport owner.

b. Asphaltic Concrete: Asphaltic concrete pavement to be removed shall be cut to the full depth of the bituminous material around the perimeter of the area to be removed. The pavement shall be removed in such a manner that the joint for each layer of pavement replacement is offset 1 ft. from the joint in the preceding layer. This does not apply if the removed pavement is to be replaced with concrete or soil. If the material is to be wasted on the airport site, it shall be broken to a maximum size as designated by the airport owner.

101-3.2 REMOVAL OF PAINT AND RUBBER. All paint and rubber over 1 ft. wide that will affect the bond of the new overlay shall be removed from the surface of the existing pavement. Chemicals, high-pressure water, heater scarifier (asphaltic concrete only), cold milling, or sandblasting may be used. Any methods used shall not cause major damage to the pavement. Major damage is defined as changing the properties of the pavement or removing pavement over 1/8 in deep. If chemicals are used, they shall comply with the state's environmental protection regulations. No material shall be deposited on the runway shoulders. All wastes shall be disposed of in areas indicated in this specification or shown on the plans. This specification shall not be used for removal of rubber deposits to improve skid resistance or obliterate traffic markings where a new overlay is not to be constructed.

101-3.3 PAVEMENT SAW CUTTING. Existing asphalt and PCCP pavement to be removed shall be saw cut by a device capable of making a neat, straight, smooth and vertical cut without damaging adjacent pavement that is not to be removed. The Engineer's decision as to the acceptability of the cutting device and manner of operation will be final. Pavement saw cutting shall be required at match lines to existing pavement that is to remain. All PCCP that is saw cut shall have the saw cut slurry material immediately vacuumed and disposed. PCCP that is saw cut and is proposed to be matched with new PCCP or with new asphalt pavement, shall have all PCCP spall repair.

101.3.4 PAVEMENT MATCHING. Existing asphalt and PCCP pavements that are to be matched shall be trimmed to a neat true line, with straight vertical edges free from irregularities using a saw specifically designed for this purpose.

Matching Asphalt Pavement. The existing asphalt pavement trimmed shall be cut full depth and be painted with a coating of asphalt cement or emulsified asphalt immediately prior to constructing the new bituminous base or surface course. No extra payment will be provided for these items and all costs incurred in performing this work shall be incidental to those items for which direct payment is made.

Matching Portland Cement Concrete Pavement. The existing Portland cement concrete pavement to match shall be cut full depth and without any irregularities and or spalling of concrete. The saw cut shall not vary more than ¼-inch when tested with a 16-feet straight edge. Irregularities and or spalling of concrete during the full depth cut shall require re-sawing at full depth at no additional cost.

101-3.5 CONCRETE SPALL OR FAILED ASPHALTIC CONCRETE PAVEMENT REPAIR.

a. Repair of Concrete Spalls in Areas to be overlaid with Asphalt: The Contractors shall repair all spalled concrete as shown on the plans or as directed by the Resident Engineer. The perimeter of the repair shall be sawed a minimum of 1 in deep or shall be cut with approved tools to this depth. 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 asphaltic concrete with a minimum Marshall stability of 1,200 lbs. and maximum flow of 20. The material shall be compacted with equipment approved by the Resident Engineer until the material is dense and no movement or marks can be noted. The material shall not be placed in lifts over 4 in in depth. This method of repair applies only to pavement to be overlaid.

b. Asphaltic Concrete Pavement Repair: 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. The base course and subbase shall be replaced if it has been infiltrated with clay, silt, or other material affecting the load-bearing capacity. Materials and methods of construction shall comply with the other applicable sections of this specification.

101-3.6 COLD PLANING.

a. Patching: The machine shall be capable of cutting a vertical edge without chipping or spalling the edges of the pavement to remain. The machine shall have a positive method of controlling the depth of cut. The Engineer shall layout the area to be milled. The area shall be laid out with straightedges in increments of 1 ft. 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 machine, or areas that are damaged because of his negligence, shall not be included in the measurement for payment.

b. Profiling, Grade Correction, or Surface Correction: The machine shall have a minimum width of 10 feet. It shall be equipped with electronic grade control devices on both sides that will cut the surface to the grade and tolerances specified. The machine shall cut vertical edges. A positive method of dust control shall be provided. The machine shall be capable of discharging the millings in a truck or leaving them in a defined windrow.

METHOD OF MEASUREMENT

101-4.1 MEASUREMENT.

a. General: If there is no quantity shown in the bidding schedule, the work covered by this section shall be considered as a subsidiary obligation of the Contractor covered under the other contract items. Only accepted work will be measured.

b. Pavement Removal: The unit of measurement for pavement removal shall be the number of square yards removed by the Contractor regardless of thickness, removed completed in conformance with these specifications. No separate measurement or payment will be made for pavement saw cuts, the cost shall be considered as a subsidiary obligation in the completion of the pavement removal. 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. Removal of all pavement reinforcing shall be incidental to pavement removal.

c. Pavement Saw Cut: The unit of measurement for pavement saw cut shall be the linear foot of saw cut per type of pavement.

d. Paint and Rubber Removal: No separate measurement or payment for paint and rubber removal shall be made.

BASIS OF PAYMENT

101-5.1 PAYMENT. Payment shall be made at contract unit price for the unit of measurement as specified hereinbefore. 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.

a. Removal of Concrete and/or Asphalt Pavement: Payment shall be made at the contract unit price per square yard for removal of concrete and/or asphalt pavements. The price shall be full compensation for furnishing all labor, equipment, tools, hauling and disposal or stockpiling of the millings and incidentals necessary to complete this item.

b. Removal of Paint and Rubber: No direct payment shall be made for removal of paint and rubber. Payment for the removal of paint and rubber shall be considered incidental to P-401 Plant Mix Bituminous Pavements used in the temporary asphalt ramps.

c. Pavement Saw Cut: Payment for Saw Cut shall be made at the unit price per linear foot per type of pavement. The unit price shall be full compensation for furnishing all materials, labor, equipment, tools and incidentals necessary to complete this item, including cleanup of waste materials and disposal at an off-site location.

d. Full Depth Removal of Concrete and/or Asphalt Pavement (Misc. Maintenance Repair): Payment shall be made at the contract unit price per square yard for removal of concrete and/or asphalt pavements. The price shall be full compensation for furnishing all labor, equipment, tools, hauling and disposal or stockpiling of the millings and incidentals necessary to complete this item.

Payment will be made under:

Item P-101-5.1 Portland Cement Concrete Pavement Removal, Including Thickened Edge and Reinforcement— per square yard

Item P-101-5.2 Bituminous Pavement Removal — per square yard

Item P-101-5.3 Cement-Treated Base Removal— per square yard

Item P-101-5.4 Concrete Pavement Saw Cut (Full Depth)— per linear foot

Item P-101-5.5 AC Pavement Saw Cut — per linear foot

CONTRACTOR QUALITY CONTROL

101-6.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with the General Provisions Section 100.

END OF ITEM P-101

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 Engineer.

Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing by burning or otherwise.

CONSTRUCTION METHODS

151-2.1 GENERAL. The areas denoted on the plans to be cleared or cleared and grubbed shall be staked on the ground by the Engineer. The clearing and grubbing shall be done at a satisfactory distance in advance of the grading operations.

All spoil materials removed by clearing or by clearing and grubbing shall be disposed of by burning, when permitted by local laws, or by removal to approved disposal areas. When burning of material is permitted, it shall be burned under the constant care of competent watchmen so that the surrounding vegetation and other adjacent property will not be jeopardized. Burning shall be done in accordance with all applicable laws, ordinances, and regulations. Before starting any burning operations, the Contractor shall notify the agency having jurisdiction.

If the plans or the specifications require the saving of merchantable timber, the Contractor shall trim the limbs and tops from designated trees, saw them into suitable lengths, and make the material available for removal by other agencies.

Blasting **IS NOT** allowed.

The removal of existing structure and utilities required to permit orderly progress of work shall be accomplished by local agencies, unless otherwise shown on the plans. Whenever a telephone or telegraph pole, pipeline, conduit, sewer, roadway, or other utility is encountered and must be removed or relocated, the Contractor shall advise the Engineer who will notify the proper local authority or owner and attempt to secure prompt action.

151-2.2 CLEARING AND GRUBBING. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where embankments exceeding 3-1/2 feet in depth are to be made outside of paved areas. In cases where such depth of embankments is to be made, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off within 6 in above the ground and allowed to remain. Tap roots and other projections over 1 ½ in in diameter shall be grubbed out to a depth of at least 18 in (45 cm) 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 there from shall be disposed of either by burning or otherwise removed from the site. The remaining or existing foundations, wells, cesspools, and all like structures shall be destroyed by breaking out or breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material that cannot be used in backfill shall be removed and disposed of. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be filled with acceptable material, moistened and properly compacted in layers to the density required in Item P-152. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

151-2.3 REMOVAL OF EXISTING PIPE. Existing pipe to be removed shall be cut at the indicated location with straight and smooth edges on a plane perpendicular to the centerline of the structure. Backfill of the trench left behind shall be accomplished in accordance with the requirements of Item P-152, Excavation and Embankment. Unless otherwise indicated on the plans, the ends of any abandoned structure that remain in the ground shall be plugged as shown in the details.

151-2.4 BACKFILLING.

a. Under Aircraft Loaded Pavements. Backfill following removals within runway, taxiway, connecting taxiways, aprons or associated shoulder pavements shall consist of select material meeting the requirements of and placed in accordance with Item P-152 compacted to not less than 100% density as determined by ASTM D 1557. The select backfill shall be placed up to the bottom of the overlaying pavement base course.

b. Under Non-Aircraft Loaded pavements. Backfill following removals within infields or other non-aircraft loaded pavements shall consist of 6-inch minus native materials and shall be placed and compacted in layers not exceeding 8-inches in compacted thickness. The native material shall be placed to the bottom of the millings in paved infields, under non-aircraft loaded pavements or within 6-inch of the top of finished grade in unpaved areas. The top 6-inch in unpaved areas shall contain 3-inch minus material. All native backfill material shall be compacted to a minimum of 95% maximum density per ASTM D 698.

METHOD OF MEASUREMENT

151-3.1 The quantities of clearing or clearing and grubbing as shown by the limits on the plans or as ordered by the Engineer shall be the number of acres or fractions thereof, of land specifically cleared or cleared and grubbed.

151-3.2 Measurement for removing existing storm drain pipes, underground electrical concrete encased ducts, underground electrical concrete encased conduits, underground electrical direct buried ducts and underground electrical direct buried conduits shall be by the linear foot of pipe, duct or conduit removed, including excavation, removal, disposal, and trench backfill, completed in conformance with these specifications, and accepted by the Engineer.

151-3.3 Measurement for removing catch basins or manholes shall be by the unit price for each catch basin or manhole removed, regardless of type, including backfill, completed in conformance with these specifications and accepted by the Engineer.

BASIS OF PAYMENT

151-4.1 Payment shall be made at the contract unit price per acre for clearing and grubbing. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

151-4.2 Payment for removing existing storm drain pipe shall be made at the contract unit price per linear foot for pipe removed. This price shall be full compensation for furnishing all labor, equipment, materials tools, and incidentals including removal, hauling, placing, and disposing of the pipe and backfill and compaction of the trench, as necessary to complete the work and be accepted by the Engineer. The payment shall be full compensation for all materials, labor equipment, and incidentals necessary to complete the work. No separate payment shall be made for backfilling and compaction

151-4.3 Payment for removing existing manholes, or catch basins shall be made at the contract unit price per each for each existing manhole, catch basin removed, regardless of size or type. This price shall be full compensation for furnishing all labor, equipment, materials tools, and incidentals including removal, hauling, placing, and disposing of the structure, and backfill and compaction of the hole left by the structure, as necessary to complete the work and be accepted by the Engineer. The payment shall be full compensation for all materials, labor equipment, and incidentals necessary to complete the work. No separate payment shall be made for backfilling and compaction.

Payment will be made under:

Item P-151-4.1	Clearing and Grubbing—per acre
Item P-151-4.2	Remove Existing Storm Drain Pipe – per linear foot.
Item P-151-4.3	Remove Existing Catch Basin or Manhole – per each

CONTRACTOR QUALITY CONTROL

151-5.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with the General Provisions Section 100.

END OF ITEM P-151

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ITEM P-152 EXCAVATION AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical 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, which is not otherwise classified and paid for under the following items.

152-1.3 Unsuitable Excavation. Any material containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material, when approved by the Engineer as suitable to support vegetation, may be used on the embankment slope.

CONSTRUCTION METHODS

152-2.1 General. Before beginning excavation, grading, and embankment operations in any area, the area shall be completely cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the Engineer. All unsuitable material shall be disposed of in waste areas shown on the plans. All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of adjacent usable areas of the airport, unless specified on the plans or approved by the Engineer.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued. At the direction of the Engineer, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Those areas outside of the pavement areas in which the top layer of soil material has become compacted, by hauling or other activities of the Contractor shall be scarified and disked to a depth of 4 in , in order to loosen and pulverize the soil.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the Engineer, who shall arrange for their removal if necessary. The Contractor shall, at his/her own expense, satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

152-2.2 EXCAVATION. No excavation shall be started until the work has been staked out by the Contractor and the Engineer has obtained elevations and measurements of the ground surface. All suitable excavated material shall be used in the formation of embankment, subgrade, or for other purposes shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

When the volume of the excavation exceeds that required to construct the embankments to the grades indicated, the excess shall be used to grade the areas of ultimate development or disposed of as directed. When the volume of excavation is not sufficient for constructing the fill to the grades indicated, the deficiency shall be obtained from borrow areas.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work.

The Contractor shall take precautions to protect and de-water excavations and subgrade work as necessary, prior to the placement of base, stabilized base and pavements. The Contractor shall provide temporary drainage at no additional cost to the Owner. Schedule and costs impacts associated with inadequate temporary drainage shall be the Contractor's responsibility.

a. Selective Grading. When selective grading is indicated on the plans, the more suitable material as designated by the Engineer shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas so that it can be measured for payment for rehandling as specified in paragraph 3.3.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turfing shall be excavated to a minimum depth of 12 in (300 mm), or to the depth specified by the Engineer, below the subgrade. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for **[ ]**. The excavated area shall be refilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary refilling will constitute a part of the embankment. Where rock cuts are made and refilled with selected material, any pockets created in the rock surface shall be drained in accordance with the details shown on the plans.

c. Overbreak. Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the Engineer. The Engineer shall determine if the displacement of such material was unavoidable and his/her decision shall be final. All overbreak shall be graded or removed by the Contractor and disposed of as directed; however, payment will not be made for the removal and disposal of overbreak that the Engineer determines as avoidable. Unavoidable overbreak 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 someone other than the Contractor, for example, the utility unless otherwise shown on the plans. All existing foundations shall be excavated for at least 2 feet below the top of subgrade or as indicated on the plans, and the material disposed of as directed. All foundations thus excavated shall be backfilled with suitable material and compacted as specified herein.

e. Compaction Requirements. The subgrade under areas to be paved shall be compacted to a depth of **8-inches** and to a density of not less than **95** percent of the maximum density as determined by ASTM **D 1557.** The material to be compacted shall be within +/- 2 percent of optimum moisture content before rolled to obtain the prescribed compaction (except for expansive soils).

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. Stones or rock fragments larger than 4 in in their greatest dimension will not be permitted in the top 6 in of the subgrade. The finished grading operations, conforming to the typical cross section, shall be completed and maintained at least 1,000 feet ahead of the paving operations or as directed by the Engineer.

In cuts, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the plans or as directed by the Engineer.

152-2.3 BORROW EXCAVATION. There are no borrow areas within the airport property. However, if the Contractor sequences the work such that material is borrowed from an off-site location for the construction of haul roads, or other uses, these materials shall not be measured for payment. All borrow material imported from an off-site location , and be in accordance with section 152-5.3d

When borrow sources are outside the boundaries of the airport property, it shall be the Contractor's responsibility to locate and obtain the supply, subject to the approval of the Engineer. The Contractor shall notify the Engineer, at least 15 days prior to beginning the excavation, so necessary measurements and tests can be made. All unsuitable material shall be disposed of by the Contractor. All borrow pits shall be opened up to expose the vertical face of various strata of acceptable material to enable obtaining a uniform product. Borrow pits shall be excavated to regular lines to permit accurate measurements, and they shall be drained and left in a neat, presentable condition with all slopes dressed uniformly.

152-2.4 DRAINAGE EXCAVATION. Drainage excavation shall consist of excavating for drainage ditches such as intercepting; inlet or outlet, for temporary levee construction; or for any other type as designed or as shown on the plans. The work shall be performed in the proper sequence with the other construction. All satisfactory material shall be placed in fills; unsuitable material shall be placed in waste areas or as directed. Intercepting ditches shall be constructed prior to starting adjacent excavation operations. All necessary work shall be performed to secure a finish true to line, elevation, and cross section.

The Contractor shall maintain ditches constructed on the project to the required cross section and shall keep them free of debris or obstructions until the project is accepted.

152.2.5 FINISHING AND PROTECTION OF SUBGRADE. After the subgrade has been substantially completed the full width shall be conditioned by removing any soft or other unstable material that will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to grade with suitable select material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans.

Grading of the subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. He/she shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts or rough places that develop in a completed subgrade shall be smoothed and recompacted.

No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer.

152-2.6 HAUL. All hauling will be considered a necessary and incidental part of the work. Its cost shall be considered by the Contractor and included in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

152-2.7 TOLERANCES. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 16 ft straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2 in, or shall not be more than 0.05 ft from true grade as established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by sprinkling and rolling.

On safety areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 ft from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.8 TOPSOIL. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its proper and final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall not be placed within **150** feet of runway pavement or **100** feet of taxiway pavement and shall not be placed on areas that subsequently will require any excavation or embankment. If, in the judgment of the Engineer, 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 rehandling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as directed, or as required in Item T-905.

No direct payment will be made for topsoil as such under Item P-152. The quantity removed and placed directly or stockpiled shall be paid for at the contract unit price per cubic yard for “Unclassified Excavation.”

When stockpiling of topsoil and later rehandling of such material is directed by the Engineer, the material so rehandled shall be paid for at the contract unit price per cubic yard (cubic meter) for “Topsoiling,” as provided in Item T-905.

METHOD OF MEASUREMENT

152-3.1 The quantity of 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, nor shall it include excavation for removals of existing improvements, proposed drainage excavation, or any other proposed utility excavation.

152-3.2 Excavation to construct haul roads shall not be measured for payment.

152-3.3 For payment specified by the cubic yard, measurement for all excavation shall be computed by the average end area method. The end area is that bound by the original ground line established by field cross sections and the final theoretical pay line established by excavation cross sections shown on the plans, subject to verification by the Engineer. After completion of all excavation operations and prior to the placing of base or subbase material, the final excavation shall be verified by the Engineer by means of field cross sections taken randomly at intervals not exceeding 500 linear feet.

Final field cross sections shall be employed if the following changes have been made:

a. Plan width of embankments or excavations are changed by more than plus or minus 1.0 ft (0.3 meter); or
b. Plan elevations of embankments or excavations are changed by more than plus or minus 0.5 ft (0.15 meter).

152-3.4 After completion of all excavation operations and prior to the placing of base or subbase material, the final excavation may be verified by the Engineer by means of field cross sections taken randomly at intervals not exceeding 500 linear feet.

BASIS OF PAYMENT

152-4.1 For "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.

Payment will be made under:

Item P-152-4.1 Unclassified Excavation-per cubic yard

CONTRACTOR QUALITY CONTROL

152-5.1 QUALITY CONTROL PROGRAM. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provision Specifications. The program shall address all elements that affect the quality of the embankment(s) being formed. A Quality Control Testing Plan for P-152 shall be developed as part of the Quality Control Program.

152-5.2 TESTING FREQUENCY. The Contractor shall establish a minimum testing frequency of one (1) density and moisture test per ASTM D 1556, for each of the following conditions:

a. For each eight (8) inch loose lift, and;

b. For subgrade compaction, the Contractor shall provide at least one (1) density and moisture test for each 2,000 square yards. For isolated areas or confined areas that are less than 2,000 square yards, there shall be at least one (1) density and moisture test.

152-5.3 QUALITY CONTROL TESTING. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not necessary be limited to tests for material density, material moisture content, rolling patterns, and fugitive dust.

Nuclear moisture and density methods meeting ASTM D 2922 and D 3017 may be used, provided that at least one (1) out of ten (10) tests are conducted using the ASTM D 1556 method to correlate test results.

b. Material Moisture Content. The material in each layer shall be within plus or minus two (2) percent of optimum moisture content before rolling to obtain the prescribed compaction.

c. Rolling Patterns. Where soils are too coarse to be tested by conventional procedures, they shall be compacted using a minimum roller specification. Each lift shall be subjected to ten (10) coverages with a vibratory roller with a total static weight of at least 25,000 pounds. The weight of the vibratory portion (including drum, shaft and internal machinery) should be at least 12,000 pounds. The frequency of the vibration during operation should be between 1,100 and 1,500 cycles per minute and the dynamic force at the operating frequency should not be less than 40,000 pounds. The maximum roller speed during operations should be no greater than 1.5 miles per hour. The soil should be thoroughly wetted during the compaction process. The compaction equipment shall be subject to the approval of the Engineer.

d. Borrow Materials. For borrow materials imported, the Contractor shall submit the name and address of the supplier; approximate amount of material to be imported; location from which the material was excavated or recovered; the gradation and plastic index of the material and a written certification from the material supplier that the borrow material(s) are free of hazardous materials and or substances as defined by local, state and federal environmental regulations. When written certification is not available from the commercial source or the Contractor source that states that the material is free of hazardous materials and/or substances, the Contractor shall arrange for the materials to be tested in accordance with the latest edition of EPA SW846 "Test Methods for Evaluation Solid Waste". Material testing shall include, but not be limited to EPA test methods 8015 petroleum hydrocarbons, 8260 (VOCs), 8270 (SVOCs), 8081/8082 (pesticides/PCBs), 8310 (PAHs), and 6010/7000 series (priority pollutant metals). All sample collections and analysis shall be performed by a state certified laboratory. The Contractor shall submit the material supplier(s) certifications and/or the certified laboratory results in the Quality Control Report for approval prior to importing any borrow materials onto Phoenix-Mesa Gateway Airport.

e. Fugitive Dust. The Contractor shall supply and operate all necessary equipment and personnel to meet the requirements for dust control. The Contractor shall document dust control procedures in the daily Quality Control reports.

TESTING REQUIREMENTS

ASTM D 698	Test for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound (2.49 kg) Rammer and 12 in (305 mm) Drop
ASTM D 1556	Test for Density of Soil In Place by the Sand-Cone Method
ASTM D 1557	Test for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D 2167	Test for Density and Unit Weight of Soil In Place by the Rubber Balloon Method.
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods

END OF ITEM P-152

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 Engineer.

MATERIALS

153-2.1 MATERIALS

a. Portland Cement. Portland cement shall conform to the requirements of ASTM **150** Type **II**. If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

b. Flyash. Flyash shall conform to ASTM C 618, Class C or F.

c. Fine Aggregate (Sand). Fine aggregate shall conform to the requirements of ASTM C 33 except for aggregate gradation. Any aggregate gradation which produces performance characteristics of the CLSM specified herein will be accepted, except as follows.

Sieve Size	Percent Passing by weight
3/4 in (19.0 mm)	100
No. 200 (0.075 mm)	0 - 12

d. Water. Water used in mixing shall be free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product.

MIX DESIGN

153-3.1 PROPORTIONS. The contractor shall submit, to the Engineer, a mix design including the proportions and source of materials, admixtures, and dry cubic yard (cubic meter) batch weights. The mix shall contain a minimum of 50 pounds of cement and 250 pounds flyash per cubic yard (30 kg of cement and 148 kg of flyash per cubic meter), with the remainder of the volume composed of sand, water, and any approved admixtures.

a. Compressive Strength. CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi (690 to 3,680 kPa) when tested in accordance with ASTM D 4832. There should be no significant strength gain after 28 days. Test specimens shall be made in accordance with ASTM D 4832.

b. Consistency. Consistency of the fresh mixture shall be such that the mixture may be placed without segregation. A desired consistency may be approximated by filling an open-ended 3 in (75 mm) diameter cylinder, 6 in (150 mm) high to the top, with the mixture and the cylinder immediately pulled straight up. The correct consistency of the mixture will produce an approximate 8 in (205 mm) diameter circular-type spread without segregation. Adjustments of the proportions of materials should be made to achieve proper solid suspension and flowable characteristics, however the theoretical yield shall be maintained at one cubic yard (cubic meter) for the given batch weights.

CONSTRUCTION METHODS

153-4.1 PLACEMENT.

a. Placement. CLSM may be placed by any reasonable means from a mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed in such a manner that structures or pipes are not displaced from their desired final position and intrusion of CLSM into undesirable areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed to the Engineer. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one layer, the base layer shall be free of surface water and loose of foreign material prior to placement of the next layer.

b. 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 (2 °C) and rising. At the time of placement, CLSM shall have a temperature of at least 40 °F (4 °C). Mixing and placement shall stop when the air temperature is 40 °F (4 °C) and falling or when the anticipated air or ground temperature will be 35 °F (2 °C) or less in the 24 hour period following proposed placement.

153-4.2 CURING AND PROTECTION

a. Curing. The air in contact with the CLSM should be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32 °F (0 °C), the material may be rejected by the Engineer 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 (105 kPa) is obtained. The Contractor shall be responsible for providing evidence to the Engineer that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

MATERIAL ACCEPTANCE

153-5.1 Acceptance. Acceptance of CLSM delivered and placed as shown on the plans or as directed by the Engineer shall be based upon mix design approval and batch tickets provided by the Contractor to confirm that the delivered material conforms to the mix design. The Contractor shall verify by additional testing, each 5,000 cubic yards (3,825 cubic meters) of material used. Verification shall include confirmation of material proportions and tests of compressive strength to confirm that the material meets the original mix design and the requirements of CLSM as defined in this specification. Adjustments shall be made as necessary to the proportions and materials prior to further production.

METHOD OF MEASUREMENT

153-6.1 Measurement. Controlled Low Strength Material will not be measured separately but shall be considered subsidiary to the associated work for which pay items are provided.

BASIS OF PAYMENT

153-7.1 Payment. Controlled Low Strength Material shall not be paid separately but shall be considered subsidiary to the associated work for which pay items are provided.

TESTING REQUIREMENTS

ASTM D 4832 Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

MATERIAL REQUIREMENTS

ASTM C 33 Specification for Concrete Aggregates
ASTM C 150 Specification for Portland Cement
ASTM C 618 Specification for Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 595 Specification for Blended Hydraulic Cements

END OF ITEM P-153

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ITEM P-155 LIME-TREATED SUBGRADE

DESCRIPTION

155-1.1 This item shall consist of constructing one or more courses of a mixture of soil, lime, and water in accordance with this specification, and in conformity with the lines, grades, thicknesses, and typical cross sections shown on the plans.

MATERIALS

155-2.1 HYDRATED LIME. All lime shall be manufactured high-calcium quicklime, low-calcium quicklime, or hydrated lime, as defined by ASTM C 51, and conform to the requirements of ASTM C 977. By product lime or any form of calcium oxide (CaO), calcium hydroxide (Ca(OH)2), magnesium oxide (MgO) or magnesium hydroxide (Mg(OH)2), alone or in combination, that are not directly produced from quicklime produced from calcining limestone, shall not be permitted.

155-2.2 COMMERCIAL LIME SLURRY. Commercial lime slurry shall be a pumpable suspension of solids in water. The water or liquid portion of the slurry shall not contain dissolved material in sufficient quantity naturally injurious or objectionable for the purpose intended. The solids portion of the mixture, when considered on the basis of "solids content," shall consist principally of hydrated lime of a quality and fineness sufficient to meet the following requirements as to chemical composition and residue.

a. Chemical Composition. The "solids content" of the lime slurry shall consist of a minimum of 70%, by weight, of calcium and magnesium oxides.

b. Residue. The percent by weight of residue retained in the "solids content" of lime slurry shall conform to the following requirements:

Residue retained on a No. 6 (3360 micron) sieve = Max. 0.0%
Residue retained on a No. 10 (2000 micron) sieve = Max. 1.0%
Residue retained on a No. 30 (590 micron) sieve = Max. 2.5%

c. Grade. Commercial lime slurry shall conform to one of the following two grades:

Grade 1. The "dry solids content" shall be at least 31% by weight, of the slurry.
Grade 2. The "dry solids content" shall be at least 35%, by weight, of the slurry.

155-2.3 WATER. Water used for mixing or curing shall be reasonably clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water shall be tested in accordance with and shall meet the suggested requirements of AASHTO T 26. Water known to be of potable quality may be used without test.

155-2.4 SOIL. The soil for this work shall consist of materials on the site or selected materials from other sources and shall be uniform in quality and gradation, and shall be approved by the Engineer. The soil shall be free of roots, sod, weeds, and stones larger than 2-1/2 in (60 mm).

COMPOSITION

155-3.1 LIME. For bidding purposes; the preliminary estimated lime content will be 6%. To compensate for construction losses, uneven distribution of lime, etc., it may be necessary to add ½ to 1 percent above the lime percentage content. Before construction the Contractor shall submit a soil-lime mix design determining the optimum lime content for the particular subgrade soil encountered at the site. The soil-lime mix design shall be submitted to the Engineer at least ten (10) days prior to the start of operations.

155-3.2 TOLERANCES. At final compaction, the lime and water content for each course of subgrade treatment shall conform to the following tolerances:

Material	Tolerance
Lime	+ 0.5%
Water	+ 2%, -0%

WEATHER LIMITATIONS

155-4.1 WEATHER LIMITATION. The lime-treated subgrade shall not be mixed while the atmospheric temperature is below 40 °F (4 °C) or when conditions indicate that temperatures may fall below 40 °F (4 °C) within 24 hours, when it is foggy or rainy, or when soil or subgrade is frozen.

EQUIPMENT

155-5.1 EQUIPMENT. The equipment required shall include all equipment necessary to complete this item such as: grading and scarifying equipment, a spreader for the lime or lime slurry, mixing or pulverizing equipment, sheepsfoot and pneumatic or vibrating rollers, sprinkling equipment, and trucks.

CONSTRUCTION METHODS

155-6.1 GENERAL. It is the primary requirement of this specification to secure a completed subgrade containing a uniform lime mixture, free from loose or segregated areas, of uniform density and moisture content, well bound for its full depth, and with a smooth surface suitable for placing subsequent courses. It shall be the responsibility of the Contractor to regulate the sequence of his/her work, to use the proper amount of lime, maintain the work, and rework the courses as necessary to meet the above requirements.

Prior to beginning any lime treatment, the subgrade shall be constructed and brought to grade as specified in Item P-152 “Excavation and Embankment” and shall be shaped to conform to the typical sections, lines, and grades as shown on the plans. The material to be treated shall then be excavated to the secondary grade (proposed bottom of lime treatment) and removed or windrowed to expose the secondary grade. Any wet or unstable materials below the secondary grade shall be corrected, as directed by the Engineer, by scarifying, adding lime, and compacting until it is of uniform stability. The excavated material shall then be spread to the desired cross section.

If the Contractor elects to use a cutting and pulverizing machine that will remove the subgrade material accurately to the secondary grade and pulverize the material at the same time, he will not be required to expose the secondary grade nor windrow the material. However, the Contractor shall be required to roll the subgrade, as directed by the Engineer, and correct any soft areas that this rolling may reveal before using the pulverizing machine. This method will be permitted only where a machine is provided which will ensure that the material is cut uniformly to the proper depth and which has cutters that will plane the secondary grade to a smooth surface over the entire width of the cut. The machine must give visible indication at all times that it is cutting to the proper depth.

155-6.2 APPLICATION. Lime shall be spread only on that area where the first mixing operations can be completed during the same working day. The application and mixing of lime with the soil shall be accomplished by the methods hereinafter described as "Dry Placing" or "Slurry Placing." When hydrated lime is specified, the Contractor may use either method.

a. Dry Placing. The lime shall be spread uniformly over the top of the subgrade by an approved screw-type spreader box or other approved spreading equipment. The amount of lime spread shall be the amount required for mixing to the specified depth that will result in the percentage determined in the job mix formula.

The lime shall be distributed in such manner that scattering by wind will be minimal. Lime shall not be applied when wind conditions, in the opinion of the Engineer, are detrimental to a proper application. A motor grader shall not be used to spread the lime. The material shall be sprinkled, as directed by the Engineer, until the proper moisture content has been reached.

b. Slurry Placing. The lime shall be mixed with water in trucks with approved distributors and applied as a thin water suspension or slurry. Commercial lime slurry shall be applied with a lime percentage not less than that applicable for the grade used. The distribution of lime shall be attained by successive passes over a measured section of subgrade until the proper amount of lime has been spread. The amount of lime spread shall be the amount required for mixing to the specified depth that will result in the percentage determined in the job mix formula. The distributor truck shall continually agitate the slurry to keep the mixture uniform.

155-6.3 MIXING. The mixing procedure shall be the same for "Dry Placing" or "Slurry Placing" as hereinafter described:

a. First Mixing. The full depth of the treated subgrade shall be mixed with an approved mixing machine. Lime shall not be left exposed for more than 6 hours. The mixing machine shall make two coverages. Water shall be added to the subgrade during mixing to provide a moisture content above the optimum moisture of the material and to ensure chemical action of the lime and subgrade. After mixing, the subgrade shall be lightly rolled to seal the surface and help prevent evaporation of moisture. The water content of the subgrade mixture shall be maintained at a moisture content above the optimum moisture content for a minimum of 48 hours or until the material becomes friable. During the curing period, the material shall be sprinkled as directed. During the interval of time between application and mixing, lime that has been exposed to the open air for 6 hours or more, or to excessive loss due to washing or blowing will not be accepted for payment.

b. Final Mixing. After the required curing time, the material shall be uniformly mixed by approved methods. If the mixture contains clods, they shall be reduced in size by blading, discing, harrowing, scarifying, or the use of other approved pulverization methods so that the remainder of the clods shall meet the following requirements when tested dry by laboratory sieves.

	Percent
Minimum of clods passing 1 1/2 in sieve	100
Minimum of clods passing No. 4 sieve	60

155-6.4 COMPACTION. Compaction of the mixture shall begin immediately after final mixing. The material shall be aerated or sprinkled as necessary to provide optimum moisture. The field density of the compacted mixture shall be at least 93 percent of the maximum density of laboratory specimens prepared from samples taken from the material in place. The specimens shall be compacted and tested in accordance with ASTM D 698. The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 6938. Any mixture that has not been compacted shall not be left undisturbed for more than 30 minutes. The moisture content of the mixture at the start of compaction shall not be below nor more than 2 percentage points above the optimum moisture content. The optimum moisture content shall be determined in accordance with ASTM D 698 and shall be less than that amount which will cause the mixture to become unstable during compaction and finishing.

The material shall be sprinkled and rolled as directed by the Engineer. All irregularities, depressions, or weak spots that develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required, and reshaping and recompacting by sprinkling and rolling. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereon or the work is accepted.

In addition to the requirements specified for density, the full depth of the material shown on the plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section is completed, tests will be made by the Engineer. If the material fails to meet the density requirements, it shall be reworked to meet these requirements. Throughout this entire operation, the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and shall conform with the typical section shown on the plans and to the established lines and grades. Should the material, due to any reason or cause, lose the required stability, density, and finish before the next course is placed or the work is accepted, it shall be recompacted and refinished at the sole expense of the Contractor.

When nuclear gauges are to be used for density determination, testing shall be done in accordance with Section 120 and ASTM D 6938.

155-6.5 FINISHING AND CURING. After the final layer or course of lime-treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The completed section shall then be finished by rolling, as directed, with a pneumatic or other suitable roller sufficiently light to prevent hair cracking. The finished surface shall not vary more than 3/8 in (9 mm) when tested with a 16 ft. (4.8 meter) straightedge applied parallel with and at right angles to the pavement centerline. Any variations in excess of this tolerance shall be corrected by the Contractor, at his/her own expense, in a manner satisfactory to the Engineer.

The completed section shall be moist-cured for a minimum of 7 days before further courses are added or any traffic is permitted, unless otherwise directed by the Engineer. Subsequent courses shall be applied within 14 days after the lime-treated subgrade is cured.

155-6.6 THICKNESS. The thickness of the lime-treated subgrade shall be determined by depth tests or cores taken at intervals so that each test shall represent no more than 300 sq. yd. (250 sq. m). When the base deficiency is more than 1/2 in (12 mm), the Contractor shall correct such areas in a manner satisfactory to the Engineer. The Contractor shall replace, at his/her expense, the base material where borings are taken for test purposes.

155-6.7 MAINTENANCE. The Contractor shall maintain, at his/her own expense, the entire lime-treated subgrade in good condition from the start of work until all the work has been completed, cured, and accepted by the Engineer.

METHOD OF MEASUREMENT

155-7.1 The yardage of lime-treated subgrade to be paid for shall be the number of square yards completed and accepted.

155-7.2 The amount of lime to be paid for shall be the number of tons (kg) of Hydrated Lime, or the calculated equivalent thereof, used as authorized. "Calculated Equivalent" will be determined by the Engineer as follows:

a. Hydrated lime delivered to the project in dry form will be measured according to the actual tonnage either spread on the subgrade or batched on site into a slurry, whichever is applicable.

b. Lime delivered to the project in slurry form will be paid for on the basis of certified chemical composition tickets and batch weight tickets. The owner shall reserve the right to have the dry lime content verified by an independent testing laboratory. If the chemical composition is reported on the basis of Pebble Quicklime, the equivalent hydrated lime will be determined in accordance with paragraph c. below.

c. If Pebble Quicklime is delivered to the project in dry form it will be measured for payment on the basis of the following formula:

$$\left(\begin{array}{c}\text{Total Quicklime}\\ \text{(CaO)(Tons)}\\ \text{x}\\ \text{\% Purity x 1.32 Factor}\end{array}\right) + \left(\begin{array}{c}\text{Total Quicklime (CaO)(Tons)}\\ \text{x}\\ \text{\% Impurities x 1.00 Factor}\end{array}\right) = \begin{array}{c}\text{Equivalent Hydrated}\\ \text{Lime } Ca(OH)_2\text{(Tons)}\end{array}$$

The foregoing will apply whether the quicklime is spread dry (if allowed) or batched into a slurry.

BASIS OF PAYMENT

155-8.1 Payment shall be made at the contract unit price per square yard for the lime-treated subgrade of the thickness shown on the plans. The price shall be full compensation for furnishing all material, except the lime, and for all preparation, delivering, placing and mixing these materials, and all labor, equipment, tools and incidentals necessary to complete this item.

155-8.2 Payment shall be made at the contract unit price per pound (kg) of lime. This price shall be full compensation for furnishing this material; for all delivery, placing and incorporation of this material; and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item P-155-8.1	Lime-Treated Subgrade (6" Depth)-per square yard
Item P-155-8.2	Lime-per pound (kg)

TESTING REQUIREMENTS

ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. (2.49 kg) Rammer and 12 in. (305 mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
AASHTO T 26	Quality of Water to be Used in Concrete

MATERIAL REQUIREMENTS

ASTM C 977	Quicklime and Hydrated Lime for Soil Stabilization

END OF ITEM P-155

Item P-208 Aggregate Base Course

DESCRIPTION

208-1.1 This item shall consist of a base course composed of uncrushed coarse aggregate bonded with either soil or fine aggregate or both. It shall be constructed on a prepared underlying course in accordance with these specifications and shall conform to the dimensions and typical cross section shown on the plans.

MATERIALS

208-2.1 UNCRUSHED COARSE AGGREGATE. The base course material shall consist of hard, durable particles or fragments of stone or gravel mixed or blended with sand, stone dust, or other similar binding or filler materials produced from approved sources. All oversized stones, rocks and boulders occurring in the pit or quarry material shall be wasted; those of acceptable quality may be crushed and become a part of the base material, provided the blend meets the specified gradations. The aggregate shall be free from vegetation, lumps, or excessive amounts of clay and other objectionable substances. The coarse aggregate shall have a percent of wear not more than 45 at 500 revolutions as determined by ASTM C 131.

208-2.2 CRUSHED COARSE AGGREGATE. The aggregates shall consist of both fine and coarse fragments of crushed stone, crushed slag, or crushed gravel mixed or blended with sand, screenings, or other similar approved materials. The crushed stone shall consist of hard, durable particles or fragments of stone and shall be free from excess flat, elongated, soft or disintegrated pieces, dirt, or other objectionable matter.

The crushed slag shall be air-cooled, blast furnace slag and shall consist of angular fragments reasonably uniform in density and quality and shall be reasonably free from thin, elongated, or soft pieces, dirt, and other objectionable matter. It shall weigh not less than 70 pounds per cubic foot (1.12 Mg/cubic meter) as determined by ASTM C 29.

The crushed gravel shall consist of hard, durable stones, rock, and boulders crushed to specified size and shall be free from excess flat, elongated, soft or disintegrated pieces, dirt, or other objectionable matter. The method used in production of crushed gravel shall be such that the fractured particles occurring in the finished product shall be as nearly constant and uniform as practicable and shall result in a minimum of 60% of the material retained on the No. 4 sieve having at least 2 fractured faces and 75% having at least 1 fractured face.

If necessary to meet this requirement or to eliminate an excess of fine, uncrushed particles, the gravel shall be screened before crushing. All stones, rocks, and boulders of inferior quality in the pit shall be wasted.

The crushed coarse aggregate shall have a percent of wear not more than 50 at 500 revolutions as determined by ASTM C 131.

All material passing the No. 4 mesh (4.75 mm) sieve produced in the crushing operation of either stone, slag, or gravel shall be incorporated in the base material to the extent permitted by the gradation requirements.

208-2.3 GRADATION. The gradation of the uncrushed or crushed material shall meet the requirements of one of the gradations given in Table 1 when tested in accordance with ASTM C 117, ASTM C 136, and ASTM D 422.

Table 1 Requirements for Gradation of Aggregate

Sieve Designation	Percentage by weight passing sieves
	1 1/2" maximum
2 in (50.0 mm)	--
1-1/2 in (37.0 mm)	100
1 in (25.0 mm)	70-100
3/4 in (13.0 mm)	55-85
No. 4 (4.75 mm)	30-60
No. 40 (0.45 mm)	10-30
No. 200 (0.075 mm)	5-15

The gradations in the table represent the limits that shall determine suitability of aggregate for use from the sources of supply. The final gradations decided on within the limits designated in the table shall 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 sieves, or vice versa.

The amount of the fraction of material passing the No. 200 mesh (0.075 mm) sieve shall not exceed one-half the fraction passing the No. 40 mesh (0.45 mm) sieve. The aggregate blend shall not contain more than 3% material finer than 0.02 mm unless all materials are produced from crushed stone.

The portion of the filler and binder, including any blended material, passing the No. 40 mesh (0.45 mm) sieve have a liquid limit not more than 25 and a plasticity index not more than 6 when tested in accordance with ASTM D 4318.

The selection of any of the gradations shown in the table shall be such that the maximum size aggregate used in any course shall be not more than two-thirds the thickness of the layer of the course being constructed.

208-2.4 FILLER FOR BLENDING. If filler, in addition to that naturally present in the base course material, is necessary for satisfactory bonding of the material, for changing the soil constants of the material passing the No. 40 mesh (0.45 mm) sieve, or for correcting the gradation to the limitations of the specified gradation, it shall be uniformly blended with the base course material at the crushing plant or at the mixing plant. The material for such purpose shall be obtained from sources approved by the Engineer and shall be of a gradation necessary to accomplish the specified gradation in the finally processed material.

The additional filler may be composed of sand, but the amount of sand shall not exceed 20% by weight of the total combined base aggregate. All the sand shall pass a No. 4 mesh (4.75 mm) sieve and not more than 5% by weight shall pass a No. 200 mesh (0.075 mm) sieve.

CONSTRUCTION METHODS

208-3.1 OPERATIONS IN PITS AND QUARRIES. All work involved in clearing and stripping pits and quarries, including handling of unsuitable material, shall be performed by the Contractor. All material shall be handled in a manner that shall secure a uniform and satisfactory base product. The base course material shall be obtained from sources that have been approved.

208-3.2 PREPARING UNDERLYING COURSE. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft, yielding places due to improper drainage conditions, hauling, or any other cause, shall be corrected and rolled to the required density before the base course is placed thereon.

To protect the underlying course and 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 METHODS OF PRODUCTION

a. Plant Mix. When provided in the proposal, or when selected by the Contractor and approved by the Engineer, the base material shall be uniformly blended or mixed in an approved plant. The mixing plant shall include bins for storage and batching of the aggregate, pump and tanks for water, and batch mixers of either the pugmill or drum type. All mineral aggregates shall be batched into the mixer by weight. The agitation shall be such that a thorough dispersion of moisture is obtained. The size of the batch and the time of mixing shall be fixed by the Engineer and shall produce the results and requirements specified. The base course material produced by combining two or more materials from different sources shall be mixed in a mixing plant described herein. The mixture material shall be at a satisfactory moisture content to obtain maximum density.

b. Travel Plant. When the use of a traveling plant is allowed, the plant shall blend and mix the materials to meet these specifications. It shall accomplish a thorough mixing in one trip. The agitation shall be such that the dispersion of the moisture is complete. The machine shall move at a uniform rate of speed and this speed shall be regulated to fix the mixing time. If a windrow-type of travel plant is employed for mixing, the aggregate shall be placed in windrows parallel to the pavement centerline.

The windrow volume shall be sufficient to cover exact areas as planned. The windrow contents shall produce a mixture of the required gradation and bonding qualities. If a travel plant is used which is of the type that mixes previously spread aggregates in-place, the material shall have been spread in such thickness and proportions as may be handled by the machine to develop a base course of the thickness of each layer and of the gradation required. With either type of equipment, the mixed material shall be at a satisfactory moisture content to obtain the maximum density.

c. Materials of Proper Gradation. When the entire base course material from coarse to fine is secured in a uniform and well-graded condition and contains approximately the proper moisture, such approved material may be handled directly to the spreading equipment. The material may be obtained from gravel pits, stockpiles, or produced from a crushing and screening plant with the proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The intent of this section of these specifications is to secure materials that will not require further mixing. The base material shall be at a satisfactory moisture content to obtain maximum density. Any minor deficiency or excess of moisture may be corrected by surface sprinkling or by aeration.

In such instances some mixing or manipulation may be required immediately preceding the rolling to obtain the required moisture content. The final operation shall be blading, if necessary, to obtain a smooth uniform surface true to line and grade.

208-3.4 PLACING.

a. The aggregate base material that is correctly proportioned, or has been processed in a plant, shall be placed on the prepared underlying course and compacted in layers of the thickness shown on the plans. The depositing and spreading of the material shall commence where designated and shall progress continuously without breaks. The material shall be deposited and spread in lanes in a uniform layer and without segregation of size to such loose depth that, when compacted, the layer shall have the required thickness. The base aggregate shall be spread by spreader boxes or other approved devices having positive thickness controls that shall spread the aggregate in the required amount to avoid or minimize the need for hand manipulation. Dumping from vehicles in piles that require rehandling shall not be permitted. Hauling over the uncompacted base course shall not be permitted.

b. The aggregate base material that has been processed in a traveling plant, or mixed and blended in-place, shall be spread in a uniform layer of required depth and width and to the typical cross section. The spreading shall be by a self-powered blade grader, mechanical spreader, or other approved method. In spreading, care shall be taken to prevent cutting into the underlying layer. The material shall be bladed until a smooth, uniform surface is obtained, true to line and grade.

c. The base course shall be constructed in a layer not less than 3 in (75 mm) nor more than 6 in (150 mm) of compacted thickness. The aggregate as spread shall be of uniform grading with no pockets of fine or coarse materials. The aggregate, unless otherwise permitted by the Engineer, shall not be spread more than 2,000 sq yd (1700 sq m) in advance of the rolling. Any necessary sprinkling shall be kept within these limits. No material shall be placed in snow or on a soft, muddy, or frozen course.

When more than one layer is required, the construction procedure described herein shall apply similarly to each layer.

During the mixing and spreading process, sufficient caution shall be exercised to prevent the incorporation of subgrade, subbase, or shoulder material in the base course mixture.

208-3.5 COMPACTION. Immediately upon completion of the spreading operations, the aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

The moisture content of the material during placing operations shall not be below, nor more than 2 percentage points above, the optimum moisture content as determined by ASTM 6938.

208-3.6 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 sq yd (2000 sq m). A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 sq yd (2000 and 4000 sq m).

Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.

Each lot will be accepted for density when the field density is at least 100 percent of the maximum density of laboratory specimens prepared from samples of the material delivered to the jobsite. The specimens shall be compacted and tested in accordance with ASTM D 1557. The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 2167. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

208-3.7 SURFACE TEST. After the course has been completely 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, reshaped, recompacted, and otherwise manipulated as the Engineer may direct until the required smoothness and accuracy are obtained. The finished surface shall not vary more than 3/8 in (9 mm) from a 16 ft (4.8 m) straightedge when applied to the surface parallel with, and at right angles to, the centerline.

208-3.8 THICKNESS. The thickness of the base course shall be determined by depth tests or cores taken at intervals in such manner that each test shall represent no more than 300 sq yd (250 sq m). When the base deficiency is more than 1/2 in (12 mm), the Contractor shall correct such areas by scarifying, adding satisfactory base mixture, rolling, sprinkling, reshaping, and finishing in accordance with these specifications. The Contractor shall replace, at his/her expense, the base material where borings have been taken for test purposes.

208-3.9 PROTECTION. Work on the base course shall not be accomplished during freezing temperatures nor when the subgrade is wet. When the aggregates contain frozen materials or when the underlying course is frozen, the construction shall be stopped.

Hauling equipment may be routed over completed portions of the base course, provided no damage results and provided that such equipment is routed over the full width of the base course to avoid rutting or uneven compaction. However, the Engineer in charge shall have full and specific authority to stop all hauling over completed or partially completed base course when, in his/her opinion, such hauling is causing damage. Any damage resulting to the base course from routing equipment over the base course shall be repaired by the Contractor at his/her own expense.

208-3.10 MAINTENANCE. Following the completion of the base course, the Contractor shall perform all maintenance work necessary to keep the base course in a condition satisfactory for priming. After priming, the surface shall be kept clean and free from foreign material. The base course shall be properly drained at all times. If cleaning is necessary, or if the prime coat becomes disturbed, any work or restitution necessary shall be performed at the expense of the Contractor.

Before preparations begin for the application of a surface treatment or for a surface course, the base course shall be allowed to partially dry until the average moisture content of the full depth of base is less than 80% of the optimum moisture of the base mixture. The drying shall not continue to the extent that the surface of the base becomes dusty with consequent loss of binder. If during the curing period the surface of the base dries too fast, it shall be kept moist by sprinkling until such time as the prime coat is applied as directed.

The Contractor shall remove all survey and grade hubs from the base courses prior to placing any bituminous surface course.

METHOD OF MEASUREMENT

208-4.1 The quantity of uncrushed aggregate base course to be paid for shall be the number of square yards of base course material placed, bonded, and accepted in the completed base course. The quantity of base course material shall be measured in final position based upon depth test, or cores taken as directed by the Engineer, or at the rate of 1 depth test for each 300 sq yd of base course, or by means of average end areas on the complete work computed from elevations to the nearest 0.01 ft. On individual depth measurements, thicknesses more than 1/2 in in excess of that shown on the plans shall be considered as specified thickness plus 1/2 in in computing the yardage for payment. 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 yard for aggregate base course. This price shall be full compensation for furnishing all materials and for all operations, hauling, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-208-5.1 Uncrushed Aggregate Base Course, 13" Depth - per square yard

TESTING REQUIREMENTS

ASTM C 29	Unit Weight of Aggregate
ASTM C 117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM D 422	Particle Size Analysis of Soils
ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12 in (305 mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D 2167	Density of Soil in Place by the Rubber-Balloon Method
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods

END OF ITEM P-208

ITEM P-209 CRUSHED AGGREGATE BASE COURSE

DESCRIPTION

209-1.1 This item consists of a base course composed of crushed aggregates constructed on a prepared course in accordance with these specifications and in conformity to the dimensions and typical cross sections shown on the plans.

MATERIALS

209-2.1 AGGREGATE. Aggregates shall consist of clean, sound, durable particles of crushed stone, crushed gravel, or crushed slag and shall be free from coatings of clay, silt, vegetable matter, and other objectionable materials and shall contain no clay balls. Fine aggregate passing the No. 4 (4.75 mm) sieve shall consist of fines from the operation of crushing the coarse aggregate. If necessary, fine aggregate may be added to produce the correct gradation. The fine aggregate shall be produced by crushing stone, gravel, or slag that meet the requirements for wear and soundness specified for coarse aggregate.

The crushed slag shall be an air-cooled, blast furnace slag and shall have a unit weight of not less than 70 pounds per cubic foot (1.12 Mg/cubic meter) when tested in accordance with ASTM C 29.

The coarse aggregate portion, defined as the material retained on the No. 4 (4.75 mm) sieve and larger, shall contain no more than 15 percent, by weight, of flat or elongated pieces as defined in ASTM D 693 and shall have at least 90 percent by weight of particles with at least two fractured faces and 100 percent with at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 to count as two fractured faces.

The percentage of wear shall not be greater than 45 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 12 percent, after 5 cycles, when tested in accordance with ASTM C 88.

The fraction passing the No. 40 (0.42 mm) sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 4 when tested in accordance with ASTM D 4318. The fine aggregate shall have a minimum sand equivalent value of 35 when tested in accordance with ASTM D 2419.

a. Sampling and Testing. Aggregates for preliminary testing shall be furnished by the Contractor prior to the start of production. All tests for initial aggregate submittals necessary to determine compliance with the specification requirements will be made by the Engineer at no expense to the Contractor.

Samples of aggregates shall be furnished by the Contractor at the start of production and at intervals during production. The sampling points and intervals will be designated by the Engineer. The samples will be the basis of approval of specific lots of aggregates from the standpoint of the quality requirements of this section.

In lieu of testing, the Engineer may accept certified state test results indicating that the aggregate meets specification requirements. Certified test results shall be less than 6 months old.

Samples of aggregates to check gradation shall be taken by the Engineer at least two per lot. The lot will be consistent with acceptable sampling for density. The samples shall be taken from the in-place,

compacted material. Sampling shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and ASTM C 117.

b. Gradation Requirements. The gradation (job mix) of the final mixture shall fall within the design range indicated in

Table 11, when tested in accordance with ASTM C 117 and ASTM C 136. The final gradation shall be continuously well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

Table 1 Requirements For Gradation Of Aggregate

Sieve Size	Design Range Percentage by Weight	Job Mix Tolerances Percent
2 in (50.0 mm)	100	0
1-1/2 (37.0 mm)	95-100	+/- 5
1 in (25.0 mm)	70-95	+/- 8
3/4 in (19.0 mm)	55-85	+/- 8
No. 4 (4.75 mm)	30-60	+/- 8
No. 30 (0.60 mm)	12-30	+/- 5
No. 200 (0.075 mm)	0-8	+/- 3

The job mix tolerances in Table 1 shall be applied to the job mix gradation to establish a job control grading band. The full tolerance still will apply if application of the tolerances results in a job control grading band outside the design range.

The fraction of the final mixture that passes the No. 200 (0.075 mm) sieve shall not exceed 60 percent of the fraction passing the No. 30 (0.60 mm) sieve.

CONSTRUCTION METHODS

209-3.1 PREPARING UNDERLYING COURSE. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected at the Contractor's expense before the base course is placed thereon. Material shall not be placed on frozen subgrade.

209-3.2 MIXING. The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the specifications and to secure the proper moisture content for compaction.

209-3.3 PLACING. The crushed aggregate base material shall be placed on the moistened subgrade in layers of uniform thickness with a mechanical spreader.

The maximum depth of a compacted layer shall be 6 in (150 mm). If the total depth of the compacted material is more than 6 in (150 mm), it shall be constructed in two or more layers. In multi-layer construction, the base course shall be placed in approximately equal-depth layers.

The previously constructed layer should be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

209-3.4 COMPACTION. Immediately upon completion of the spreading operations, the crushed aggregate shall be thoroughly compacted. The number, type, and weight of rollers shall be sufficient to compact the material to the required density.

The moisture content of the material during placing operations shall not be below, nor more than 2 percentage points above, the optimum moisture content as determined by ASTM **[ ]**.

209-3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY. Aggregate base course shall be accepted for density on a lot basis. A lot will consist of one day's production where it is not expected to exceed 2400 sq yd. A lot will consist of one-half day's production where a day's production is expected to consist of between 2400 and 4800 sq yd.

Each lot shall be divided into two equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with statistical procedures contained in ASTM D 3665.

Each lot will be accepted for density when the field density is at least 100 percent of the maximum density of laboratory specimens prepared from samples of the base course material delivered to the job site. The specimens shall be compacted and tested in accordance with **ASTM 1557**. The in-place field density shall be determined in accordance with ASTM D 1556 or D 2167. If the specified density is not attained, the entire lot shall be reworked and/or recompacted and two additional random tests made. This procedure shall be followed until the specified density is reached.

In lieu of the core method of field density determination, acceptance testing may be accomplished using a nuclear gauge in accordance with ASTM D 6938 . The gauge should be field calibrated in accordance with Section 120 and ASTM standards. Calibration tests shall be conducted on the first lot of material placed that meets the density requirements.

When using the nuclear method ASTM D 6938 shall be used to determine the moisture content of the material. The calibration curve furnished with the nuclear gauges shall be checked in accordance with ASTM standards. The calibration checks shall be made at the beginning of a job and at regular intervals.

If a nuclear gauge is used for density determination, two random readings shall be made and averaged for each sublot.

209-3.6 FINISHING. The surface of the aggregate base course shall be finished by blading or with automated equipment especially designed for this purpose.

In no case will the addition of thin layers of material be added to the top layer of base course to meet grade. If the elevation of the top layer is 1/2 in (12 mm) or more below grade, the top layer of base shall be scarified to a depth of at least 3 in (75 mm), new material added, and the layer shall be blended and recompacted to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and rerolled.

209-3.7 SURFACE TOLERANCES. The finished surface shall not vary more than 3/8 in (9 mm) when tested with a 16 ft (4.8 m) straightedge applied parallel with or at right angles to the centerline. Any deviation in excess of this amount shall be corrected by the Contractor at the Contractor's expense.

209-3.8 THICKNESS CONTROL. The completed thickness of the base course shall be within 1/2 in (12 mm) of the design thickness. Four determinations of thickness shall be made for each lot of material placed. The lot size shall be consistent with that specified in paragraph 3.5. Each lot shall be divided into

four equal sublots. One test shall be made for each sublot. Sampling locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Where the thickness is deficient by more than 1/2 in (12 mm), the Contractor shall correct such areas at no additional cost by excavating to the required depth and replacing with new material. Additional test holes may be required to identify the limits of deficient areas.

209-3.9 MAINTENANCE. The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

The Contractor shall remove all survey and grade hubs from the base courses prior to placing any bituminous surface course.

METHOD OF MEASUREMENT

209-4.1 The quantity of crushed aggregate base course to be paid for will be determined by measurement of the number of square yards of material actually constructed and accepted by the Engineer as complying with the plans and specifications.

BASIS OF PAYMENT

209-5.1 Payment shall be made at the contract unit price per square for crushed aggregate base course. This price shall be full compensation for furnishing all materials, for preparing and placing these materials, and for all labor, equipment tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-209-5.1 Crushed Aggregate Base Course (6” Depth)--per square yard

Item P-209-5.1 Crushed Aggregate Base Course (10” Depth)--per square yard

TESTING REQUIREMENTS

ASTM C 29	Unit Weight of Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Degradation of Small-Size Coarse Aggregate by abrasion and impact in the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM D 75	Sampling Aggregate
ASTM D 422	Particle Size Analysis of Soils
ASTM D 693	Crushed Aggregate for Macadam Pavements
ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5-lb (2.49-kg) Rammer and 12 in (305 mm) Drop
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test for Laboratory Compaction Characteristics of Soil Using Modified Effort
ASTM D 2167	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
ASTM D 3665	Random Sampling of Construction Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils

END OF ITEM P-209

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ITEM P-221 CHOKE STONE INTERLAYER

DESCRIPTION

221-1.1 DESCRIPTION. This item shall consist of a choke stone interlayer comprised of crushed mineral aggregate applied to the surface of a stabilized and/or permeable base layer placed beneath Portland cement concrete (PCC) pavement as a bond breaker. The material shall be applied to the surface of the subject layer in accordance with these specifications and in conformity to the lines, grades, dimensions, and typical cross sections shown on the plans.

MATERIALS

221-2.1 AGGREGATE. The method used in producing the aggregate shall be such that the finished product is as consistent as practicable. The aggregate shall consist of clean, sound, hard, durable, angular particles of crushed stone that meets the specification requirements. The aggregate shall be free from clay balls, organic matter, and other deleterious substances in accordance with ASTM C 33, Class 4S.

Choke stone shall be made of hard, durable, crushed aggregate having at least 90 percent fractured faces. The aggregate shall contain not more than 15 percent, by weight, of flat or elongated pieces, as defined in ASTM D 4791 when tested in a 5:1 ratio. The percentage of wear of the crushed aggregate retained on the No. 4 sieve shall not be greater than 50 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 10 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88.

The aggregate shall conform to the gradation shown in Table 1 or the gradation requirements for ASTM No. 89 stone, when tested in accordance with ASTM C 136. The aggregate shall be continuously well graded from coarse to fine and the gradation shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

Table 1. Aggregate gradation for CHOKE STONE material.

Sieve Size	Percentage by Weight Passing Sieves Choke Stone
½ in	100
⅜ in	80 - 100
No. 4	10 - 100
No. 8	5 - 50
No. 16	0 - 10

221-2.2 SUBMITTALS. At least 30 days prior to the placement of the choke stone, the Contractor shall submit certified test reports to the Engineer for the material proposed for use during construction. The certification shall show the appropriate ASTM specifications or tests for the material, the name of the company performing the tests, the date of the tests, the test results, and a statement that the material did or did not comply with the applicable specifications.

Tests older than 6 months shall not be used. No choke stone shall be placed until the submittal is approved by the Engineer.

CONSTRUCTION METHODS

221-3.1 WEATHER LIMITATIONS. The choke stone may not be placed when rainfall is occurring or where rain is imminent.

221-3.2 PLACEMENT. The choke stone aggregate shall be spread into a single uniform layer of such width and thickness that, following compaction, it conforms to the required grade and cross-section. The choke stone shall be placed immediately after final compaction of the underlying course. The choke stone shall be spread in a thin layer no thicker than ½ in using spreading equipment approved by the Engineer.

221-3.3 COMPACTION. Immediately upon completion of the spreading operations, the choke stone material shall be evenly spread with no humps / depressions in the surface.

MATERIAL ACCEPTANCE

221-4.1 ACCEPTANCE SAMPLING AND TESTING. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor. Testing organizations performing these tests shall meet the requirements of ASTM D 3666. All equipment in Contractor-furnished laboratories shall be calibrated by the testing organization prior to the start of operations.

Aggregate samples shall be furnished by the Contractor in accordance with ASTM D 75 for laboratory testing prior to the start of production. Additionally, the Contractor shall furnish aggregate samples at specified intervals during production. Sampling for gradation shall be in accordance with ASTM D 75, and testing shall be in accordance with ASTM C 136 and C 117.

221-4.2 ACCEPTANCE CRITERIA. Completed choke stone layers shall be determined as “acceptable” or "unacceptable" on the basis of visual inspection. The Engineer shall immediately notify the Contractor of visual defects, such as improper thickness, non-uniform texture, evidence of material segregation, surface irregularities, and evidence of aggregate crushing during the rolling operations.

METHOD OF MEASUREMENT

221-5.1 No separate measurement shall be made for choke stone interlayer. All costs associated with the choke stone interlayer shall be considered incidental to P-501 Portland Cement Concrete Pavement.

BASIS OF PAYMENT

221-6.1 No direct payment shall be made under this item. Payment for the choke stone interlayer is incidental to P-501 Portland Cement Concrete Pavement.

TESTING REQUIREMENTS

ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Sieve or Screen Analysis of Fine and Course Aggregates
ASTM D 75	Sampling Aggregates
ASTM D 693	Crushed Stone, Crushed Slag, and Crushed Gravel for Dry or Water-Bound Macadam Base Courses and Bituminous Macadam Base and Surface Courses of Pavements
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 5821	Determining the Percentage of Fractured Particles in Coarse Aggregate

END OF ITEM P-221

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ITEM P-304 CEMENT-TREATED BASE COURSE

DESCRIPTION

304-1.1 This item shall consist of a cement-treated base (CTB) course composed of mineral aggregate and cement, uniformly blended and mixed with water. The mixed material shall be spread and shaped with a mechanical spreader, and compacted with rollers in accordance with these specifications and in conformance to the lines, grades, dimensions, and cross-sections shown on the plans.

MATERIALS

304-2.1 AGGREGATE. The aggregate shall be select granular materials, comprised of crushed or uncrushed gravel and/or stone, or recycled crushed and graded Portland Cement Concrete (PCC). The material shall be free of roots, sod, and weeds. The crushed or uncrushed aggregate shall consist of hard, durable particles of accepted quality, free from an excess of soft, flat, elongated, or disintegrated pieces, and objectionable matter. The method used in producing the aggregate shall be such that the finished product is as consistent as practicable. All stones and rocks of inferior quality shall be wasted.

The percentage of wear of the crushed aggregate retained on the No. 4 (4.75-mm) sieve shall not be greater than 40 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 10 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88.

When tested in accordance with ASTM C 136, the aggregate shall conform to the gradations shown in Table 1. An aggregate blend that meets the requirements of Table 1 shall be selected by the Contractor and used in the final mix design. The final aggregate blend shall be well graded from coarse to fine within the limits designated in the table and shall not vary from the low limit on one sieve to the high limit on adjacent sieves, or vice versa. The portion of final aggregate blend passing the No. 40 (425 µm) sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 6 when tested in accordance with ASTM D 4318.

Table 1. Aggregate Gradation for CTB Material

Sieve Size	Percentage by Weight Passing Sieves	
	Gradation A	Gradation B
2 in (51 mm)	100 [1]	100 [1]
No. 4 (4.75 mm)	45 - 100	55 - 100
No. 10 (1.80 mm)	37 - 80	45 - 100
No. 40 (450 µm)	15 - 50	25 - 80
No. 80 (210 µm)	0 - 25	10 - 35
[1] Maximum size of aggregate is 1 in (25.4 mm) when used as a base course under Item P-501, Portland Cement Concrete Pavement.		

All aggregate samples required for testing shall be furnished by the Contractor at the expense of the Contractor. Sampling shall be performed by the Contractor in accordance with ASTM D 75.

304-2.2 CEMENT. Cement shall conform to the requirements of ASTM C 150, Type I/II.

304-2.3 CEMENTITIOUS ADDITIVES. Pozzolanic and ground granulated blast furnace (GGBF) slag may be added to the CTB mix. If used, each material must meet the following requirements:

a. Pozzolan. Pozzolanic materials must meet the requirements of ASTM C 618, Class C, F, or N with the exception of loss of ignition, where the maximum shall be less than 6 percent for Class F or N. The supplementary optional chemical and physical properties of Tables 1A and 2A contained in ASTM C 618 shall apply.

b. GGBF Slag. Slag shall conform to ASTM C 989, Grade 80, 100, or 120.

304-2.4 WATER. Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other deleterious substances injurious to the finished product. Water shall be tested in accordance with the requirements of AASHTO T 26. Water known to be of potable quality may be used without testing.

304-2.5 CURING MATERIALS. Curing materials shall conform to the requirements provided below, as defined by the type of pavement surface to be placed on top of the CTB layer.

304-2.5.1 Portland Cement Concrete (PCC) Pavement. For curing CTB placed under PCC pavement, use white-pigmented, liquid membrane-forming compound conforming to ASTM C 309, Type 2, Class A or Class B (wax-based).

304-2.5.2 Hot Mix Asphalt (HMA) Pavement. For curing CTB placed under HMA pavement, use emulsified asphalt conforming to ASTM C 977 or ASTM D 2397 (Table 2).

304-2.6 SAND BLOTTER. If emulsified asphalt is used as a curing material, sand shall be applied, when required, for the prevention of pick-up of emulsion curing materials. The sand material shall be clean, dry, and non-plastic.

COMPOSITION OF MIXTURE

304-3.1 GENERAL. The CTB material shall be composed of a mixture of aggregate, [Portland cement] [blended hydraulic cement], and water. Flyash or GGBF slag may be used as a partial replacement for Portland cement.

304-3.2 MIX DESIGN. The mix design shall use a cement content that, when tested in the laboratory according to ASTM D 1633, produces a 7-day compressive strength meeting the following requirements:

a. For CTB placed under PCC pavement: 500 psi (3,447 kPa) minimum and 1,000 psi (6,895 kPa) maximum.

b. For CTB placed under HMA pavement: 750 psi (5,170 kPa) minimum and 1,000 psi (6,895 kPa) maximum.

The mix design shall include a complete list of materials, including type, brand, source, and amount of cement, fine aggregate, coarse aggregate, water, and cementitious additives, if used. It shall also contain the 7-day compressive strength test results and the results of the wet-dry and/or freeze-thaw tests. Should a change be made in aggregate sources or type of cement, or if cementitious additives are added or deleted from the mix, production of the CTB mix shall be stopped and a new mix design shall be submitted.

304-3.3 SUBMITTALS. At least **10 days** prior to the placement of the CTB, the Contractor shall submit certified test reports to the Engineer for those materials proposed for use during construction, as well as the mix design information for the CTB material. Tests older than 6 months shall not be used. The certification shall show the ASTM or AASHTO specifications or tests for the material, the name of the company performing the tests, the date of the tests, the test results, and a statement that the material did or did not comply with the applicable specifications. The submittal package shall include the following:

a. Sources of materials, including aggregate, cement, cementitious additives, curing, and bond-breaking materials.

b. Physical properties of the aggregates, cement, cementitious additives, curing, and bond-breaking materials.

c. Mix design
- Mix identification number
- Aggregate gradation
- Cement content
- Water content
- Cementitious materials content

d. Laboratory test results
- Compaction and strength testing procedures
- Laboratory compaction characteristics (maximum dry density and optimum moisture content)
- Compressive strength at 7 days
- Wet-dry and/or freeze-thaw weight loss, if applicable

No CTB material shall be placed until the submittal is accepted in writing by the Engineer.
During production, the Contractor shall submit batch tickets for each delivered load.

EQUIPMENT

All equipment necessary to mix, transport, place, compact, and finish the CTB material shall be furnished by the Contractor. The equipment shall be inspected and approved by the Engineer at the job site prior to the start of construction operations.

304-4.1 MIXING. The mixer shall be a batch or continuous-flow type stationary mixer and shall be equipped with calibrated metering and feeding devices that introduce the aggregate, cement, water, and cementitious additives (if used) into the mixer in the specified quantities. If necessary, a screening device shall be used to remove oversized material greater than 2 in (51 mm) from the raw aggregate feed prior to mixing.

Free access to the plant must be provided at all times for inspection of the plant's equipment and operation and for sampling the CTB mixture and its components, as deemed necessary by the Engineer.

304-4.2 HAULING. The mixed CTB material shall be transported from the plant to the job site in trucks or other hauling equipment having beds that are smooth, clean, and tight. Truck bed covers shall be provided and used to protect the CTB from rain. CTB material that becomes wet during transport shall be subject to rejection.

304-4.3 PLACING. CTB material shall be placed using a mechanical spreader or a machine capable of receiving, spreading, and shaping the mixture without segregation into a uniform layer or lift. The equipment shall be equipped with a strike-off plate capable of being adjusted to the specified layer thickness. It shall also be equipped with two end gates or cut off plates, so that the CTB may be spread in widths varying up to lane width.

304-4.4 COMPACTION. Compaction of the CTB layer shall be accomplished using one or a combination of the following pieces of equipment:

- Tamping or grid roller
- Steel-wheeled roller
- Vibratory roller
- Pneumatic-tire roller
- Vibrating plate compactor (for areas inaccessible to rollers)

The number, type, and weight of rollers and/or compactors shall be sufficient to compact the mixture to the required density.

304-4.5 FINISHING. Final trimming of the compacted CTB to meet surface requirements shall be accomplished using a self-propelled grader or trimming machine, with a mold board cutting edge, which is at least 12 ft (3.7 m) wide and is automatically controlled by sensors in conjunction with an independent grade control from a taut stringline. Stringline will be required on both sides of the sensor controls for the pilot lane. For all other lanes, a single stringline on the outside and grade matching with previously completed adjacent lanes is permissible.

CONSTRUCTION METHODS

304-5.1 WEATHER LIMITATIONS.

304-5.1.1 Cold Weather. The CTB material shall not be mixed or placed while the air temperature is below 40 °F (4 °C) or when conditions indicate that the temperature may fall below 35 °F (2 °C) within 24 hours. The CTB shall not be placed on frozen surfaces.

304-5.1.1 Rain. The CTB may not be placed when rainfall is occurring. If an unexpected rain event occurs during placement, the layer should be quickly compacted. CTB material that becomes wet by rain during transport or placement shall be evaluated by the Engineer, and may be subject to rejection.

304-5.2 PREPARATION OF UNDERLYING COURSE. The underlying course shall be checked by the Engineer before placing and spreading operations are started, in order to ensure that it is free of any ruts, depressions, or bumps and is finished to the correct grade. Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause, shall be corrected before the CTB mixture is placed thereon. The underlying course shall be wetted in advance of placing the CTB layer. The final prepared grade prior to placing the CTB should be in a firm and moist condition free of frost. Use of chemicals to eliminate frost will not be permitted.

To ensure proper drainage, placement of the base shall begin along the centerline of the pavement on a crowned section or on the highest elevation contour of a pavement with variable cross slope.

304-5.3 GRADE CONTROL. Grade control between the edges of the CTB shall be accomplished at intervals of 50 ft (15.2 m) or less on the longitudinal grade and at 25 ft (7.6 m) or less on the transverse grade.

304-5.4 HANDLING, MEASURING, AND BATCHING. The continuous flow central plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Aggregate stockpiles shall be constructed in a manner that prevents segregation and intermixing of deleterious materials.

Aggregates that are segregated or mixed with earth or foreign material will not be accepted.

Continuous flow plants shall be equipped with feeders to proportion aggregates and bulk cement, by weight, automatically and accurately. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper to transporting container or into the batch itself for transportation to the mixer, such as a chute, boot or other device, to prevent loss of cement. The device shall be arranged to provide positive assurance that the cement content specified is present in each batch.

304-5.5 MIXING. Aggregate and cement may be proportioned either by weight or volume, and shall be mixed sufficiently to prevent the forming of cement balls when water is added. The mixing time shall be that which is required to secure an intimate, uniform mixture of aggregate, cement, water, and pozzolan (if used). The minimum mixing time will be based on the uniformity and consistency of the mixture.

304-5.6 PLACING. The CTB mixture shall be deposited on the moistened subgrade or subbase and spread into a uniform layer of such width and thickness that, following compaction and trimming, conforms to the required grade and cross-section. The Contractor may install the CTB layer in single or multiple compacted lifts; however, each compacted lift must be no greater than 6 in (152 mm) thick. In multi-lift construction, the surface of the compacted lift shall be kept moist until covered with the next lift. Successive lifts shall be placed and compacted so that the required total depth of the CTB layer is completed within 12 hours.

A single spreader may be used, provided it is capable of placing a uniform, full-depth layer of material across the full width of the base in one pass. Otherwise, two or more spreaders will be required, and shall be operated so that spreading progresses along the full width of the base in a uniform manner.

304-5.7 COMPACTION. Immediately upon completion of the spreading operations, the CTB material shall be thoroughly compacted using approved compaction equipment. At the start of compaction, the moisture content shall be within 2 percentage points of the specified optimum moisture.

304-5.8 FINISHING. Upon completion of compaction, the surface of the CTB layer shall be shaped to the specified lines, grades, and cross-section. During the finishing process, the surface shall be kept moist by means of fog-type sprayers. Compaction and finishing shall be done in such a manner as to produce a smooth, dense surface, free of ruts, cracks, ridges, and loose material. All placement, compaction, and finishing operations shall be completed within 2 hours from the start of mixing. Material not completed within the 2-hour time limit shall be removed and replaced at the Contractor's expense.

CTB layer limits that extend beyond the edges of the new PCC surface course shall be rolled down or shaped in such a manner that the drainage is away from the new PCC surface course edge.

304-5.9 CONSTRUCTION JOINTS. At the end of each day's construction, a transverse construction joint shall be formed that is a true vertical face (perpendicular to the centerline) and is free of loose material.

Longitudinal construction joints (parallel to the centerline) shall be formed to a consistent, well-defined near vertical edge that is free of loose material. The longitudinal joints shall be located such that there is a 2 ft (0.6 m) minimum offset from planned joints in any overlying layer.

While forming construction joints, the Contractor shall make sure the material in the joint area is adequately compacted and that the joints are finished level and even with the remainder of the CTB layer.

304-5.10 CURING. The compacted and finished CTB shall be cured with the approved curing agents as soon as possible, and in no case later than 2 hours after completion of the finishing operations. The layer shall be kept moist using a moisture-retaining cover or a light application of water until the curing material is applied.

When asphalt emulsion is used as the curing agent, the entire surface of the CTB layer shall be uniformly sprayed with the emulsion at a rate of between 0.15 and 0.30 gal/sq yd (0.7 and 1.4 L/m^2); the exact temperature and rate of application being that required to achieve complete and uniform coverage without runoff. Should it be necessary for construction equipment or other traffic to use the asphalt-covered surface, sufficient sand blotter cover shall be applied to prevent pick-up.

When liquid membrane-forming curing compound is used as the curing agent, the entire surface of the CTB layer shall be uniformly sprayed with the compound at the rate of 1 gal (3.8 L) to not more than 200 sq ft (18.6 m^2). The rate of application shall be determined such that a uniform surface is obtained. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. The compound shall be thoroughly mixed with the pigment uniformly dispersed throughout the storage tank. During application, the compound shall be stirred continuously by effective mechanical means. Hand spraying of odd widths or shapes and CTB surfaces exposed by the removal of forms is permitted.

The curing seal shall be maintained and protected until the pavement is placed. Should the surface of the finished CTB and/or the curing seal become damaged, additional curing material shall be applied at the time it is damaged or when the damage is first observed.

304-5.11 PROTECTION. The Contractor shall protect the finished CTB against traffic. Completed portions of the CTB layer can be opened immediately to low-speed traffic and to construction equipment, provided the curing material is not damaged and the CTB is sufficiently stable to resist permanent deformation. Should the CTB be damaged, it shall be replaced using full-depth patches, and sprayed with the selected curing compound as described above. The CTB shall also be protected from freezing at all times.

304-5.12 BOND-BREAKER. When the CTB is to be placed directly beneath PCC, a bond-breaker selected by the Contractor shall be used. The entire surface of the CTB shall be coated with a de-bonding compound applied in a quality sufficient to prevent bonding of the PCC pavement to the base course. If an impervious membrane or asphalt emulsion is used as a curing material, additional applications of curing materials may be required. The Contractor shall be responsible for selecting the de-bonding compound and determining the necessary application rate. The de-bonding compound shall be approved by the Engineer prior to being incorporated into the work.

MATERIAL ACCEPTANCE

304-6.1 ACCEPTANCE SAMPLING AND TESTING. All acceptance sampling and testing, with the exception of thickness determination, necessary to determine conformance with the requirements specified in this section will be performed by the Engineer. The Contractor shall provide the required

CTB samples during construction for acceptance testing purposes. The samples shall be taken in the presence of the Engineer.

Testing organizations performing these tests shall meet the requirements of ASTM D 3666. All test equipment in Contractor-furnished laboratories shall be calibrated by the testing organization prior to the start of operations.

The CTB layer shall be tested for density, thickness, grade, and surface tolerance on a lot basis, with a lot consisting of one of the following:

- One day's production not to exceed [2,000 sq yd (1,675 m^2)].
- A half day's production, where a day's production consists of [2,000 to 4,000 sq yd (1,675 to 3,350 m^2)].

Each lot shall be divided into four (4) equal sublots. Within each sublot, one (1) density test, one (1) thickness measurement, and continuous surface straightedge tests (surface tolerance testing) shall be performed, as described below. Sampling locations shall be determined by the Engineer in accordance with the random sampling procedures contained in ASTM D 3665.

In the event that only three (3) sublots are produced, the three sublots shall constitute a complete lot. If one (1) or two (2) sublots are produced for the same reason, they shall be incorporated into the next or previous lot, and the total number of sublots shall be used in the acceptance criteria calculation.

End-of-production sublots (that is, sublots associated with the final placement of CTB for the project and are less than a complete lot) shall be handled as follows:

- Three (3) sublots shall constitute a lot.
- One (1) or two (2) sublots shall be incorporated into the previous lot.

304-6.1.1 Density Testing. CTB samples shall be taken from each sublot and used to create laboratory test specimens representing the various sublots. The specimens shall be compacted and tested for density and moisture content in accordance with ASTM D 558. Using the density results for each sublot comprising a lot, an average density for the lot shall be determined, which will serve as the basis for acceptance of the lot with regard to density.

Within each sublot in the field, one (1) in-place density test shall be performed in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938. The location of the test shall be randomly selected in accordance with the procedures contained in ASTM D 3665. The in-place density results for each sublot comprising the lot shall then be averaged and compared with the corresponding average lot density. Acceptance criteria for CTB density are provided in paragraph 304-6.2.1.

304-6.1.2 Thickness Testing. The CTB shall be tested for thickness using the same lot and sublot designations established for density testing. After 3 days of curing, one (1) 4 in (102 mm) diameter core per sublot shall be obtained from a random location, as identified using the procedures contained in ASTM D 3665. The thickness of each sampled core shall be determined using the caliper measurement procedures provided in ASTM C 174. The average thickness for the lot shall be determined using the individual sublot core thicknesses. Acceptance criteria for CTB thickness are provided in paragraph 304-6.2.2. At all locations where cores have been drilled, the resulting core holes shall be filled by the Contractor with CTB, HMA, or non-shrink grout.

304-6.1.3 Grade Testing. The elevations of the finished CTB shall be surveyed every 25 ft (7.6 m) on both sides of the CTB lane as soon as it has hardened sufficiently. Acceptance criteria for CTB grade are provided in paragraph 306-6.2.3.

304-6.1.4 Surface Tolerance Testing. As soon as the CTB has hardened sufficiently, it shall be tested for surface tolerance with a 16 ft (4.9 m) straightedge or other approved measuring device.

304-6.2 ACCEPTANCE CRITERIA. Acceptance of CTB will be based on density, thickness, grade, and surface tolerance, as described in the paragraphs below.

304-6.2.1 Density Requirements. With respect to density, each lot of compacted material will be accepted without adjustment if the average in-place density of the lot is equal to or greater than 98 percent of the average density determined for the lot. Each lot of compacted CTB shall be accepted and payment adjusted in accordance with Table 3.

Table 3 Sliding Pay Scale Factors For Density

Average Dry Density (%)	Payment (%)
98.0 and greater	100
97.0 - 97.9	95
96.0 - 96.9	90
95.0 - 95.9	75
Less than 95.0	Reject

If the average density is below 95 percent, the lot will be rejected and shall be removed and replaced at the Contractor's expense. In multi-layer construction, density shall be tested for each lift, and all lifts within a rejected lot shall be removed and replaced. No payment shall be made for removed lifts. Replacement lifts shall be paid in accordance with this section.

304-6.2.2 Thickness Requirements. The completed thickness shall be as shown on the plans. When the average lot thickness is not deficient by more than ½ in (12.5 mm) from the plan thickness, full payment shall be made. If the average lot thickness is deficient by more than 1 in (25.4 mm), it shall be removed and replaced at the Contractor's expense. When such measurement is deficient by more than ½ in (12.5 mm) but less than 1 in (25.4 mm) from the plan thickness, one additional core shall be taken at random from each sublot within the lot. The thickness of these additional cores shall be determined as indicated in paragraph 304-6.1.2. A new average lot thickness shall be recomputed based on these additional cores and the original cores taken from each sublot. If the recomputed average lot thickness is not deficient by more than ½ in (12.5 mm) from the plan thickness, full payment shall be made. If the average lot thickness is deficient by more than ½ in (12.5 mm) from the plan thickness, the entire lot shall be removed and replaced at the Contractor's expense or shall be permitted to remain in-place at an adjusted payment of 75 percent of the contract unit price.

When the measured thickness is more than that indicated on the plans, it will be considered as conforming to the requirements, provided the surface of the completed CTB layer is within the established grade and surface tolerance requirements.

304-6.2.3 Grade Requirements. When the completed surface is higher than ½ in (12.5 mm) above the grade shown in the plans, the surface shall be trimmed, at the Contractor's expense, with an approved grinding machine to an elevation that falls within a tolerance of ¼ in (6 mm) or less.

304-6.2.4 Surface Tolerance Requirements. The finished surface shall not vary more than ⅜ in (9.5 mm) when tested with a 16 ft (4.9 m) straightedge applied parallel with, or at right angles to, the

centerline of the CTB area. Areas in the CTB showing high spots greater than ⅜ in (9.5 mm) over 16 ft (4.9 m) shall be marked and immediately trimmed with an approved grinding machine. Such trimming shall be at the Contractor's expense.

METHOD OF MEASUREMENT

304-7.1 CEMENT-TREATED BASE COURSE. The quantity of cement-treated base course to be paid for will be determined by measurement of the number of square yard of CTB actually constructed and accepted by the Engineer as complying with the plans and specifications.

BASIS OF PAYMENT

304-8.1 CEMENT-TREATED BASE COURSE. Payment shall be made at the contract unit price per square yard for cement-treated base course. This price shall be full compensation for furnishing all materials, including cement; for all preparation, manipulation, placing, and curing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Each lot of CTB material will be accepted for density at the full contract price adjusted in accordance with Table 3 in paragraph 304-6.2.1.

Payment will be made for:

Item P-304-8.1 Cement-Treated Base Course (10-inch Depth)--per square yard.

Item P-304-8.2 Cement-Treated Base Course (12-inch Depth)--per square yard.

TESTING REQUIREMENTS

ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 131	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Sieve or Screen Analysis of Fine and Coarse Aggregate
ASTM C 174	Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM D 75	Sampling Aggregates
ASTM D 558	Moisture-Density Relations of Soil-Cement Mixtures
ASTM D 559	Test Methods for Wetting & Drying Compacted Soil Cement Mixtures
ASTM D 560	Freezing-and-Thawing Tests of Compacted Soil-Cement Mixtures
ASTM D 1556	Density of Soil in Place by the Sand-Cone Method
ASTM D 1633	Compressive Strength of Molded Soil-Cement Cylinders
ASTM D 2167	Density of Soil in Place by the Rubber-Balloon Method
ASTM D 6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods
ASTM D 3665	Random Sampling of Paving Materials
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
AASHTO T 26	Quality of Water to be Used in Concrete

MATERIAL REQUIREMENTS

ASTM C 150	Portland Cement
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 595	Blended Hydraulic Cements
ASTM C 618	Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 989	Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM D 977	Emulsified Asphalt
ASTM D 2397	Cationic Emulsified Asphalt

END OF ITEM P-304

ITEM P-403 PLANT MIX BITUMINOUS PAVEMENTS (SURFACE COURSE)

DESCRIPTION

403-1.1 This item shall consist of a surface course composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.

MATERIALS

403-2.1 AGGREGATE. Aggregates shall consist of crushed stone, crushed gravel, or crushed slag with or without natural sand or other inert finely divided mineral aggregate. The portion of combined materials retained on the No. 4 (4.75 mm) sieve is coarse aggregate. The portion of combined materials passing the No. 4 (4.75 mm) sieve and retained on the No. 200 (0.075 mm) sieve is fine aggregate, and the portion passing the No. 200 (0.075 mm) sieve is mineral filler.

a. Coarse Aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating and bonding with the bituminous material and be free from organic matter and other deleterious substances. The percentage of wear shall not be greater than 40 percent when tested in accordance with ASTM C 131. The sodium sulfate soundness loss shall not exceed 10 percent, or the magnesium sulfate soundness loss shall not exceed 13 percent, after five cycles, when tested in accordance with ASTM C 88.

Aggregate shall contain at least 70 percent by weight of individual pieces having two or more fractured faces and 85 percent by weight having at least one fractured face. The area of each face shall be equal to at least 75 percent of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30 degrees to count as two fractured faces. Fractured faces shall be obtained by crushing.

The aggregate shall not contain more than a total of 8 percent, by weight, of flat particles, elongated particles, and flat and elongated particles, when tested in accordance with ASTM D 4791 with a value of 5:1.

Slag shall be air-cooled, blast furnace slag, and shall have a compacted weight of not less than 70 pounds per cubic foot (1.12 mg/cubic meter) when tested in accordance with ASTM C 29.

b. Fine Aggregate. Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

Natural (non-manufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification. **[**The fine aggregate shall not contain more than 15 percent natural sand by weight of total aggregates.**]** If used, the natural sand shall meet the requirements of ASTM D 1073 and shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested in accordance with ASTM D 4318.

The aggregate shall have sand equivalent values of 45 or greater when tested in accordance with ASTM D 2419.

c. Sampling. ASTM D 75 shall be used in sampling coarse and fine aggregate, and ASTM C 183 shall be used in sampling mineral filler.

403-2.2 MINERAL FILLER. If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of ASTM D 242.

403-2.3 BITUMINOUS MATERIAL. Bituminous material shall conform to the following requirements: Asphalt cement binder shall conform to AASHTO MP1 Performance Grade (PG) 64-22.

The Contractor shall furnish vendor's certified test reports for each lot of bituminous material shipped to the project. The vendor's certified test report for the bituminous material can be used for acceptance or tested independently by the Engineer.

403-2.4 PRELIMINARY MATERIAL ACCEPTANCE. Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

a. Coarse Aggregate.
(1) Percent of wear.
(2) Soundness.
(3) Unit weight of slag.
(4) Percent fractured faces

b. Fine Aggregate.
(1) Liquid limit.
(2) Plasticity index.
(3) Sand equivalent.

c. Mineral Filler.

d. Bituminous Material. Test results for bituminous material shall include temperature/viscosity charts for mixing and compaction temperatures.

The certifications shall show the appropriate ASTM tests for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

403-2.5 ANTI-STRIPPING AGENT. Any anti-stripping agent or additive if required shall be heat stable, shall not change the asphalt cement viscosity beyond specifications, shall contain no harmful ingredients, shall be added in recommended proportion by approved method, and shall be a material approved by the Department of Transportation of the State in which the project is located.

COMPOSITION

403-3.1 COMPOSITION OF MIXTURE. The bituminous plant mix shall be composed of a mixture of well-graded aggregate, filler and anti-strip agent if required, and bituminous material. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

403-3.2 JOB MIX FORMULA. No bituminous mixture for payment shall be produced until a job mix formula has been approved in writing by the Engineer. The bituminous mixture shall be designed using procedures contained in Chapter 5, MARSHALL METHOD OF MIX DESIGN, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete, sixth edition, and shall meet the requirements of Tables 1, 2 and 3.

Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D 4867, shall not be less than 75. Anti-stripping agent shall be added to the asphalt, as necessary, to produce a TSR of not less than 75. If an anti-strip agent is required, it will be provided by the Contractor at no additional cost to the Owner.

The job mix formula shall be submitted in writing by the Contractor to the Engineer at least **20** days prior to the start of paving operations and shall include as a minimum:

a. Percent passing each sieve size for total combined gradation, individual gradation of all aggregate stockpiles and percent by weight of each stockpile used in the job mix formula.
b. Percent of asphalt cement.
c. Asphalt performance, viscosity or penetration grade, and type of modifier if used.
d. Number of blows of hammer compaction per side of molded specimen.
e. Mixing temperature.
f. Compaction temperature.
g. Temperature of mix when discharged from the mixer.
h. Temperature-viscosity relationship of the asphalt cement.
i. Plot of the combined gradation on the Federal Highway Administration (FHWA) 45 power gradation curve.
j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content.
k. Percent natural sand.
l. Percent fractured faces.
m. Percent by weight of flat particles, elongated particles, and flat and elongated particles (and criteria).
n. Tensile Strength Ratio (TSR).
o. Anti-strip agent (if required).

The Contractor shall submit to the Engineer the results of verification testing of three (3) asphalt samples prepared at the optimum asphalt content. The average of the results of this testing shall indicate conformance with the job mix formula requirements specified in Tables 1, 2 and 3.

When the project requires asphalt mixtures of differing aggregate gradations, a separate job mix formula and the results of job mix formula verification testing must be submitted for each mix.

The job mix formula for each mixture shall be in effect until a modification is approved in writing by the Engineer. Should a change in sources of materials be made, a new job mix formula must be submitted within **10** days and approved by the Engineer in writing before the new material is used. After the initial production job mix formula has been approved by the Engineer and a new or modified job mix formula is required for whatever reason, the subsequent cost of the Engineer's approval of the new or modified job mix formula will be borne by the Contractor. There will be no time extension given or considerations for extra costs associated with the stoppage of production paving or restart of production paving due to the time needed for the Engineer to approve the initial, new or modified job mix formula.

Table 1. Marshall Design Criteria

Test Property	Pavements Designed for Aircraft Gross Weights of 60,000 Lb or More or Tire Pressures of 100 PSI or More	
Number of blows	75	
Stability, pounds (Newtons) minimum	1800	
Flow, 0.01 in. (0.25 mm)	8-16	
Air voids (percent)	2-5	
Percent voids in mineral aggregate, minimum	See Table 2.	

Table 2. Minimum Percent Voids In Mineral Aggregate

Maximum Particle Size		Minimum Voids in Mineral Aggregate, percent
in	**mm**	**Percent**
½	12.5	16
¾	19.0	15
1	25.0	14
1 ½	37.5	13

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory sieves, will conform to the gradation or gradations specified in Table 3 when tested in accordance with ASTM C 136 and C 117.

The gradations in Table 3 represent the limits that shall determine the suitability of aggregate for use from the sources of supply. The aggregate, as selected (and used in the JMF), shall have a gradation within the limits designated in Table 3 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be well graded from coarse to fine.

Deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the action limits for individual measurements as specified in paragraph 403-6.5a. The limits still will apply if they fall outside the master grading band in Table 3.

The maximum size aggregate used shall not be more than one-half of the thickness of the course being constructed except where otherwise shown on the plans or ordered by the Engineer.

Table 3. Aggregate - Bituminous Pavements Sieve Size	Percentage by Weight Passing Sieve
1 ½ in. (37.50 mm)	--
1 in. (25.0 mm)	--
¾ in. (19.0 mm)	100
½ in. (12.5 mm)	79-99
⅜ in. (9.5 mm)	68-88
No. 4 (4.75 mm)	48-68
No. 8 (2.36 mm)	33-53
No. 16 (1.18 mm)	20-40
No. 30 (0.60 mm)	14-30
No. 50 (0.30 mm)	9-21
No. 100 (0.15 mm)	6-16
No. 200 (0.075 mm)	3-6
Asphalt Percent:	
Stone or gravel	5.0-7.5
Slag	6.5-9.5

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute Manual Series No. 2 (MS-2), Chapter 3.

403-3.3 RECYCLED ASPHALT CONCRETE. Recycled HMA shall not be used on the project.

403-3.4 TEST SECTION. Prior to full production, the Contractor shall prepare and place a quantity of bituminous mixture according to the job mix formula. The amount of mixture shall be sufficient to construct a test section **300** feet long and **25** feet wide**,** placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. A cold joint is an exposed construction joint at least 4 hours old or whose mat has cooled to less than 160 °F. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.
The test section shall be evaluated for acceptance as a single lot in accordance with the acceptance criteria in paragraph 403-5.1 and 403-6.3. The test section shall be divided into equal sublots. As a minimum the test section shall consist of 3 sublots.

The test section shall be considered acceptable if the average mat density of the test section cores is greater than or equal to 98 percent and the average joint density of the test section cores is greater than or equal to 95 percent. If the initial test section should prove to be unacceptable, the necessary adjustments to the job mix formula, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable section has been constructed and accepted in writing by the Engineer. Once an acceptable test section has been placed, payment for the initial test section and the section that meets specification requirements shall be made in accordance with paragraph 403-8.1.

Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the job mix formula. If the aggregates produced by the plant do not satisfy the gradation requirements or produce a mix that meets the JMF, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens shall be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

403-3.5 JOB MIX (JMF) FORMULA LABORATORY. The Contractor's laboratory used to develop the job mix formula (JMF) shall meet the requirements of ASTM D 3666. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for developing the JMF must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

CONSTRUCTION METHODS

403-4.1 WEATHER LIMITATIONS. The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

Table 4. Base Temperature Limitations

Mat Thickness	Base Temperature (Minimum)	
	Deg. F	Deg. C
3 in. (7.5 cm) or greater	40	4
Greater than 1 in. (2.5 cm) but less than 3 in. (7.5 cm)	45	7
1 in. (2.5 cm) or less	50	10

403-4.2 BITUMINOUS MIXING PLANT. Plants used for the preparation of bituminous mixtures shall conform to the requirements of ASTM D 995 with the following changes:

a. Requirements for all plants include:

(1) Truck Scales. The bituminous mixture shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of the General Provisions, Section 90-01.

In lieu of scales, and as approved by the Engineer, asphalt mixture weights may be determined by the use of an electronic weighing system equipped with an automatic printer that weighs the total paving mixture. Contractor must furnish calibration certification of the weighing system prior to mix production and as often thereafter as requested by the Engineer.

(2) Testing Facilities. The Contractor shall provide laboratory facilities at the plant for the use of the Engineer's acceptance testing and the Contractor's quality control testing. The Engineer will always have priority in the use of the laboratory. The lab shall have sufficient space and equipment so that both testing representatives (Engineer's and Contractor's) can operate efficiently. The lab shall also meet the requirements of ASTM D 3666. The plant testing laboratory shall have a floor space area of not less than 150 sq ft, with a ceiling height of not less than 7-½ feet. The laboratory shall be weather tight, sufficiently heated in cold weather, air-conditioned in hot weather to maintain temperatures for testing purposes of 70 °F +/- 5 °F. The plant testing laboratory shall be located on the plant site to provide an unobstructed view, from one of its windows, of the trucks being loaded with the plant mix materials.

Laboratory facilities shall be kept clean, and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor's laboratory facility and witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting the test results, the incorporation of the materials into the work shall be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

As a minimum, the plant testing laboratory shall have:

a. Adequate artificial lighting
b. Electrical outlets sufficient in number and capacity for operating the required testing equipment and drying samples
c. Fire extinguishers (2), Underwriter's Laboratories approved
d. Work benches for testing, minimum 2-½ feet by 10 feet
e. Desk with 2 chairs
f. Sanitary facilities convenient to testing laboratory
g. Exhaust fan to outside air, minimum 12 in blade diameter
h. A direct telephone line and telephone including a FAX machine operating 24 hours per day, seven days per week
i. File cabinet with lock for Engineer
j. Sink with running water, attached drain board and drain capable of handling separate material
k. Metal stand for holding washing sieves
l. Two element hot plate or other comparable heating device, with dial type thermostatic controls for drying aggregates
m. Mechanical shaker and appropriate sieves (listed in JMF, Table 3) meeting the requirements of ASTM E-11 for determining the gradation of coarse and fine aggregates in accordance with ASTM C 136
n. Marshall testing equipment meeting ASTM D 6926, ASTM D 6927, or ASTM D 5581 as necessary, automatic compaction equipment capable of compacting three specimens at once and other apparatus as specified in ASTM C 127, D 2172, D 2726, and D 2041
o. Oven, thermostatically controlled, inside minimum 1 cubic foot
p. Two volumetric specific gravity flasks, 500 CC
q. Other necessary hand tools required for sampling and testing
r. Library containing contract specifications, latest ASTM volumes 4.01, 4.02,4.03 and 4.09, AASHTO standard specification parts I and II, and Asphalt Institute Publication MS-2
s. Equipment for Theoretical Specific Gravity testing including a 4,000 cc pycnometer, vacuum pump capable of maintaining 30 ml mercury pressure and a balance, 16-20 km with accuracy of 0.5 grams
t. Extraction equipment, centrifuge and reflux types and Rotoflex equipment
u. A masonry saw with diamond blade for trimming pavement cores and samples
v. Telephone

Approval of the plant and testing laboratory by the Engineer requires all facilities and equipment to be in good working order during production, sampling and testing. Failure to provide the specified facilities shall be sufficient cause for disapproving bituminous plant operations.

The Owner shall have access to the lab and at the plant whenever Contractor is producing asphalt for the project.

(3) Inspection of Plant. The Engineer, or Engineer's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.

(4) Storage Bins and Surge Bins. Use of surge bins or storage bins for temporary storage of hot bituminous mixtures will be permitted as follows:

a. The bituminous mixture may be stored in surge bins for a period of time not to exceed 3 hours.
b. The bituminous mixture may be stored in insulated storage bins for a period of time not to exceed 24 hours**.**

The bins shall be such that mix drawn from them meets the same requirements as mix loaded directly into trucks.

If the Engineer determines that there is an excessive amount of heat loss, segregation or oxidation of the mixture due to temporary storage, no temporary storage will be allowed.

403-4.3 HAULING EQUIPMENT. Trucks used for hauling bituminous mixtures shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of an approved asphalt release agent. Petroleum products shall not be used for coating truck beds. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

403-4.4 BITUMINOUS PAVERS. Bituminous pavers shall be self-propelled with an activated heated screed, capable of spreading and finishing courses of bituminous plant mix material that will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

The paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices that will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

The controls shall be capable of working in conjunction with any of the following attachments:

a. Ski-type device of not less than 30 feet (9.14 m) in length
b. Taut stringline (wire) set to grade
c. Short ski or shoe
d. Laser control

If, during construction, it is found that the spreading and finishing equipment in use leaves tracks or indented areas, or produces other blemishes in the pavement and/or base course that are not satisfactorily corrected by the scheduled operations, the use of such equipment shall be discontinued and satisfactory equipment shall be provided by the Contractor.

403-4.5 ROLLERS. Rollers of the vibratory, steel wheel, and pneumatic-tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition.

All rollers shall be specifically designed and suitable for compacting hot mix bituminous concrete and shall be properly used. Rollers that impair the stability of any layer of a pavement structure or underlying soils shall not be used. Depressions in pavement surfaces caused by rollers shall be repaired by the Contractor at its own expense.

The use of equipment that causes crushing of the aggregate will not be permitted.

a. Nuclear Densometer. The Contractor shall have on site a nuclear densometer during all paving operations in order to assist in the determination of the optimum rolling pattern, type of roller and frequencies, as well as to monitor the effect of the rolling operations during production paving. The Contractor shall also supply a qualified technician during all paving operations to calibrate the nuclear densometer and obtain accurate density readings for all new bituminous concrete. These densities shall be supplied to the Engineer upon request at any time during construction. No separate payment will be made for supplying the density gauge and technician.

403-4.6 PREPARATION OF BITUMINOUS MATERIAL. The bituminous material shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of the bituminous material delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325 °F (160 °C), unless otherwise required by the manufacturer.

403-4.7 PREPARATION OF MINERAL AGGREGATE. The aggregate for the mixture shall be heated and dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350 °F (175 °C) when the asphalt is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

403-4.8 PREPARATION OF BITUMINOUS MIXTURE. The aggregates and the bituminous material shall be weighed or metered and introduced into the mixer in the amount specified by the job mix formula.

The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in ASTM D 2489, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95 percent of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all bituminous mixtures upon discharge shall not exceed 0.5 percent.

403-4.9 PREPARATION OF THE UNDERLYING SURFACE. Immediately before placing the bituminous mixture, the underlying course shall be cleaned of all dust and debris. A prime coat or tack coat shall be applied in accordance with P-603, if shown on the plans.

403-4.10 LAYDOWN PLAN, TRANSPORTING, PLACING, AND FINISHING. Prior to the placement of the bituminous mixture, the Contractor shall prepare a laydown plan for approval by the Engineer. This is to minimize the number of cold joints in the pavement. The laydown plan shall include the sequence of paving laydown by stations, width of lanes, temporary ramp locations, and laydown temperature. The laydown plan shall also include estimated time of completion for each portion of the work (that is, milling, paving, rolling, cooling, etc.). Modifications to the laydown plan shall be approved by the Engineer.

The bituminous mixture shall be transported from the mixing plant to the site in vehicles conforming to the requirements of paragraph 403-4.3. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

The Contractor may elect to use a material transfer vehicle to deliver mix to the paver.

Paving during nighttime construction shall require the following:

- **a.** All paving machines, rollers, distribution trucks and other vehicles required by the Contractor for his operations shall be equipped with artificial illumination sufficient to safely complete the work.
- **b.** Minimum illumination level shall be twenty (20) horizontal foot candles and maintained in the following areas:
  (1) An area of 30 feet wide by 30 feet long immediately behind the paving machines during the operations of the machines.
  (2) An area 15 feet wide by 30 feet long immediately in front and back of all rolling equipment, during operation of the equipment.
  (3) An area 15 feet wide by 15 feet long at any point where an area is being tack coated prior to the placement of pavement.
- **c.** As partial fulfillment of the above requirements, the Contractor shall furnish and use, complete artificial lighting units with a minimum capacity of 3,000 watt electric beam lights, affixed to all equipment in such a way to direct illumination on the area under construction.
- **d.** In addition, the Contractor shall furnish sufficient portable floodlight units to provide an acceptable finished product.

The initial placement and compaction of the mixture shall occur at a temperature suitable for obtaining density, surface smoothness, and other specified requirements but not less than 250 ºF (121 ºC).

Edges of existing bituminous pavement abutting the new work shall be saw cut and carefully removed as shown on the drawings and painted with bituminous tack coat before new material is placed against it.

Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 12 foot except where edge lanes require less width to complete the area. Additional screed sections shall not be attached to widen paver to meet the minimum lane width requirements specified above unless additional auger sections are added to match. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 1 ft (30 cm); 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 (3 m) from transverse joints in the previous course.

Transverse joints in adjacent lanes shall be offset a minimum of 10 feet (3 m).

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and luted by hand tools. Areas of segregation in the course, as determined by the Engineer, shall be removed and replaced at the Contractor's expense. The area shall be removed by saw cutting and milling a minimum of 2 in deep. The area to be removed and replaced shall be a minimum width of the paver and a minimum of 10 feet long.

403-4.11 COMPACTION OF MIXTURE. After placing, the mixture shall be thoroughly and uniformly compacted by power rollers. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once.
Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained.

To prevent adhesion of the mixture to the roller, the wheels shall be equipped with a scraper and kept properly moistened using a water soluble asphalt release agent approved by the engineer.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with approved power driven tampers. Tampers shall weigh not less than 275 pounds, have a tamping plate width not less than 15 in, be rated at not less than 4,200 vibrations per minute, and be suitably equipped with a standard tamping plate wetting device.

Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

403-4.12 JOINTS. The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be given a tack coat of bituminous material before placing any fresh mixture against the joint.

Longitudinal joints which are irregular, damaged, uncompacted, or otherwise defective **[**or which have been left exposed for more than 4 hours, or whose surface temperature has cooled to less than 160^0 F**]** shall be cut back 6 inches to expose a clean, sound surface for the full depth of the course. All contact surfaces shall be cleaned and dry and given a tack coat of bituminous material prior to placing any fresh mixture against the joint. The cost of this work and tack coat shall be considered incidental to the cost of the bituminous course.

MATERIAL ACCEPTANCE

403-5.1 ACCEPTANCE SAMPLING AND TESTING. Unless otherwise specified, all acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor. Testing organizations performing these tests shall meet the requirements of ASTM D 3666. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction. All equipment in Contractor furnished laboratories shall be calibrated by an independent testing organization prior to the start of operations.

a. Field Placed Material. Material placed in the field shall be tested for mat and joint density on a lot basis. A lot will consist of:

- One day or shift's production not to exceed 2,000 tons (1,814 t), or
- A half day or shift's production where a day's production is expected to consist of between 2,000 and 4,000 tons (1,814 and 3,628 t), or similar subdivisions for tonnages over 4,000 tons (3,628 t).

Where more than one plant is simultaneously producing material for the job, the lot sizes shall apply separately for each plant.

(1) Mat Density. The lot shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Cores shall not be taken closer than 1 ft from a transverse or longitudinal joint.

(2) Joint Density. The lot shall be divided into four equal sublots. One core of finished, compacted materials shall be taken by the Contractor from each sublot. Core locations will be determined by the Engineer on a random basis in accordance with procedures contained in ASTM D 3665. Edge of cores will be taken within 6 in of the joint of the same lot material but not directly on the joint.

(3) Sampling. Samples shall be neatly cut with a core drill. The cutting edge of the core drill bit shall be of hardened steel or other suitable material with diamond chips embedded in the metal cutting edge. The minimum diameter of the sample shall be 5 in. Samples that are clearly defective, as a result of sampling, shall be discarded and another sample taken. The Contractor shall furnish all tools, labor, and materials for cutting samples, cleaning, and filling the cored pavement. Cored pavement shall be cleaned and core holes shall be filled in a manner acceptable to the Engineer and within one day after sampling.

(4) Testing. The bulk specific gravity of each cored sample will be measured by the Engineer in accordance with ASTM D 2726 or ASTM D 1188, whichever is applicable. The percent compaction (density) of each sample will be determined by dividing the bulk specific gravity of each sublot sample by the average bulk specific gravity of all laboratory prepared specimens for the lot, as determined as follows:

(a) Sufficient material for preparation of test specimens for all testing will be sampled by the Engineer on a random basis, in accordance with the procedures contained in ASTM D 3665. One set of laboratory compacted specimens will be prepared for each sublot in accordance with ASTM D 6926, at the number of blows required by paragraph 403-3.2, Table 1. Each set of laboratory compacted specimens will consist of three test portions prepared from the same sample increment. The sample of bituminous mixture may be put in a covered metal tin and placed in an oven for not less than 30 minutes or more than 60 minutes to stabilize to compaction temperature. The compaction temperature of the specimens shall be as specified in the job mix formula.

(b) The bulk specific gravity of each test specimen shall be measured by the Engineer in accordance with ASTM D 2726 using the procedure for laboratory-prepared thoroughly dry specimens, or ASTM D 1188, whichever is applicable, for use in computing pavement density.

(c) The bulk specific gravity used to determine the joint density at joints formed between different lots shall be the lowest of the bulk specific gravity values from the two different lots.

(5) Acceptance. Acceptance of field placed material for mat and joint density will be determined by the Engineer in accordance with the requirements of paragraph 403-5.2b.

d. Partial Lots - Field Placed Material. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or other minor tonnage placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

The last batch produced where production is halted will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. In addition, an agreed to minor placement will be sampled, and its properties shall be considered as representative of the particular sublot from which it was taken. Where three sublots are produced, they shall constitute a lot. Where one or two sublots are produced, they shall be incorporated into the next lot, and the total number of sublots shall be used in the acceptance plan calculation, that is, n = 5 or n = 6, for example. Partial lots at the end of asphalt production on the project shall be included with the previous lot.

403-5.2 ACCEPTANCE CRITERIA.

a. General. Acceptance will be based on the following characteristics of the bituminous mixture and completed pavement and test results:

(1) Mat density
(2) Joint density
(3) Thickness
(4) Smoothness
(5) Grade

Mat density will be evaluated for acceptance in accordance with paragraph 403-5.2b(1). Joint density will be evaluated for acceptance in accordance with paragraph 403-5.2b(2).

Thickness will be evaluated by the Engineer for compliance in accordance with paragraph 403-5.2b(3). Acceptance for smoothness will be based on the criteria contained in paragraph 403-5.2b(4). Acceptance for grade will be based on the criteria contained in paragraph 403-5.2b(5).

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of bituminous mixture which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Acceptance Criteria.

(1) Mat Density. Acceptance of each lot of plant produced material for mat density shall be based on the average of all of the densities taken from the sublots. If the average mat density of the lot so established equals or exceeds 96 percent, the lot shall be acceptable. If the average mat density of the lot is below 96 percent, the lot shall be removed and replaced at the Contractor's expense.

(2) Joint Density. Acceptance of each lot of plant produced material for joint density shall be based on the average of all of the joint densities taken from the sublots. If the average joint density of the lot so established equals or exceeds 94 percent, the lot shall be acceptable. If the average joint density of the lot is less than 94 percent, the Contractor shall stop production and evaluate the method of compacting joints. Production may resume once the reason for poor compaction has been determined and appropriate measures have been taken to ensure proper compaction.

(3) Thickness. Thickness of each course shall be evaluated by the Engineer for compliance to the requirements shown on the plans. Measurements of thickness shall be made by the Engineer using the cores extracted for each sublot for density measurement. The maximum allowable deficiency at any point shall not be more than ¼ in less than the thickness indicated for the lift. Average thickness of lift, or combined lifts, shall not be less than the indicated thickness. Where thickness deficiency exceeds the specified tolerances, the lot or sublot shall be corrected by the Contractor at his expense by removing the deficient area and replacing with new pavement. The Contractor, at his expense, may take additional cores as approved by the Engineer to circumscribe the deficient area.

(4) Smoothness. The final surface shall be free from roller marks. The finished surfaces of each course of the pavement, except the finished surface of the final surface course, shall not vary more than ⅜ in when evaluated with a 16 ft straightedge. The finished surface of the final surface course shall not vary more than ¼ in when evaluated with a 16 ft straightedge. The lot size shall be **2,000** square yards. Smoothness measurements shall be made at 50 ft intervals and as determined by the Engineer. In the longitudinal direction, a smoothness reading shall be made at the center of each paving lane. In the transverse direction, smoothness readings shall be made continuously across the full width of the pavement. However, transverse smoothness readings shall not be made across designed grade changes. At warped transition areas, straightedge position shall be adjusted to measure surface smoothness and not design grade transitions. When more than 15 percent of all measurements within a lot exceed the specified tolerance, the Contractor shall remove the deficient area to the depth of the course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. High point grinding will be limited to 15 sq yd. Areas in excess of 15 sq yd will require removal and replacement of the course in accordance with the limitations noted above.

(5) Grade. The finished surface of the pavement shall not vary from the gradeline elevations and cross sections shown on the plans by more than ½ in (12.70 mm). The finished grade of each lot will be determined by running levels at intervals of 50 feet (15.2 m) or less longitudinally and all breaks in grade transversely (not to exceed 50 feet) to determine the elevation of the completed pavement. The Contractor shall pay the cost of surveying of the level runs that shall be performed by a licensed surveyor. The documentation, stamped and signed by a licensed surveyor, shall be provided by the Contractor to the Engineer. The lot size shall be **2,000** square yards. When more than 15 percent of all the measurements within a lot are outside the specified tolerance, or if any one shot within the lot deviates ¾ in or more from planned grade, the Contractor shall remove the deficient area to the depth of the final course of pavement and replace with new material. Skin patching shall not be permitted. Isolated high points may be ground off providing the course thickness complies with the thickness specified on the plans. High point grinding will be limited to 15 sq yd. The surface of the ground pavement shall have a texture consisting of grooves between 0.090 and 0.130 in wide. The peaks and ridges shall be approximately 1/32 in higher than the bottom of the grooves. The pavement shall be left in a clean condition. The removal of all of the slurry resulting from the grinding operation shall be continuous. The grinding operation should be controlled so the residue from the operation does not flow across other lanes of pavement. Areas in excess of 15 sq yd will require removal and replacement of the pavement in accordance with the limitations noted above.

c. Density Outliers. If the tests within a lot include a very large or a very small value that appears to be outside the normal limits of variation, check for an outlier in accordance with ASTM E 178, at a significance level of 5 percent, to determine if this value should be discarded.

403-5.3 RESAMPLING PAVEMENT FOR MAT DENSITY.

a. General. Resampling of a lot of pavement will only be allowed for mat density and then, only if the Contractor requests same in writing, within 48 hours after receiving the written test results from the Engineer. A retest will consist of all the sampling and testing procedures contained in paragraphs 403-5.1b(1). Only one resampling per lot will be permitted.

(1) A redefined mat density shall be calculated for the resampled lot. The number of tests used to calculate the redefined mat density shall include the initial tests made for that lot plus the retests.

(2) The cost for resampling and retesting shall be borne by the Contractor.

b. Payment for Resampled Lots. The redefined mat density for a resampled lot shall be used to evaluate the acceptance of that lot in accordance with Paragraph 403-5.2.

CONTRACTOR QUALITY CONTROL

403-6.1 GENERAL. The Contractor shall perform quality control sampling, testing, and inspection during all phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements, and at minimum test frequencies required by paragraph 403-6.3, including but not limited to:

a. Mix Design
b. Aggregate Grading
c. Quality of Materials
d. Stockpile Management
e. Proportioning
f. Mixing and Transportation
g. Placing and Finishing
h. Joints
i. Compaction
j. Surface smoothness

403-6.2 TESTING LABORATORY. The Contractor shall provide a fully equipped asphalt laboratory meeting the requirements of paragraph 403-3.5 and 403-4.2a(2) located at the plant or job site. The Contractor shall provide the Engineer with certification stating that all of the testing equipment to be used is properly calibrated and will meet the specifications applicable for the specified test procedures.

403-6.3 QUALITY CONTROL TESTING. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these specifications and as set forth in the approved Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness.

a. Asphalt Content. A minimum of two tests shall be performed per lot in accordance with ASTM D 2172 for determination of asphalt content. The weight of ash portion of the test, as described in ASTM D 2172, shall be determined as part of the first test performed at the beginning of plant production; and as part of every tenth test performed thereafter, for the duration of plant production. The last weight of ash value obtained shall be used in the calculation of the asphalt content for the mixture. The asphalt content for the lot will be determined by averaging the test results.

The use of the nuclear method for determining asphalt content in accordance with ASTM D 4125 is permitted, provided that it is calibrated for the specific mix being used.

b. Gradation. Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of extracted aggregate in accordance with ASTM D 5444 and ASTM C 136 (dry sieve). When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch plants, or from the cold feed on drum mix or continuous mix plants, and tested in accordance with ASTM C 136 (dry sieve) using actual batch weights to determine the combined aggregate gradation of the mixture.

c. Moisture Content of Aggregate. The moisture content of aggregate used for production shall be determined a minimum of once per lot in accordance with ASTM C 566.

d. Moisture Content of Mixture. The moisture content of the mixture shall be determined once per lot in accordance with ASTM D 1461 or AASHTO T 110.

e. Temperatures. Temperatures shall be checked, at least four times per lot, at necessary locations to determine the temperatures of the dryer, the bitumen in the storage tank, the mixture at the plant, and the mixture at the job site.

f. In-Place Density Monitoring. The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density in accordance with ASTM D 2950.

g. Additional Testing. Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor's option.

h. Monitoring. The Engineer reserves the right to monitor any or all of the above testing.

403-6.4 SAMPLING. When directed by the Engineer, the Contractor shall sample and test any material that appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be in accordance with standard procedures specified.

403-6.5 CONTROL CHARTS. The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for aggregate gradation and asphalt content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

a. Individual Measurements. Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation and asphalt content. The control charts shall use the job mix formula target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

Control Chart Limits For Individual Measurements		
Sieve	**Action Limit**	**Suspension Limit**
¾ in (19.0 mm)	0%	0%
½ in (12.5 mm)	+/-6%	+/-9%
⅜ in (9.5 mm)	+/-6%	+/-9%
No. 4 (4.75 mm)	+/-6%	+/-9%
No. 16 (1.18 mm)	+/-5%	+/-7.5%
No. 50 (0.30 mm)	+/-3%	+/-4.5%
No. 200 (0.075 mm)	+/-2%	+/-3%
Asphalt Content	+/-0.45%	+/-0.70%

b. Range. Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of n = 2. Should the Contractor elect to perform more than two tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for n = 3 and by 1.27 for n = 4.

Control Chart Limits Based On Range (Based On n = 2)	
Sieve	**Suspension Limit**
½ in (12.5 mm)	11 percent
⅜ in (9.5 mm)	11 percent
No. 4 (4.75 mm)	11 percent
No. 16 (1.18 mm)	9 percent
No. 50 (0.30 mm)	6 percent
No. 200 (0.075 mm)	3.5 percent
Asphalt Content	0.8 percent

c. Corrective Action. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

(1) One point falls outside the Suspension Limit line for individual measurements or range; or
(2) Two points in a row fall outside the Action Limit line for individual measurements.

403-6.6 QUALITY CONTROL REPORTS. The Contractor shall maintain records and shall submit reports of quality control activities daily.

METHOD OF MEASUREMENT

403-7.1 MEASUREMENT. Plant mix bituminous concrete pavement shall be measured by the number of tons of bituminous mixture used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

BASIS OF PAYMENT

403-8.1 PAYMENT. Payment for a lot of bituminous concrete pavement meeting all acceptance criteria as specified in paragraph 403-5.2 shall be made at the contract unit price per ton for bituminous mixture. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-403-8.1a Bituminous Pavement (3" Shoulder Surface Course) - per ton

TESTING REQUIREMENTS

ASTM C 29	Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 117	Materials Finer than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 127	Specific Gravity and Absorption of Coarse Aggregate
ASTM C 131	Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 183	Sampling and the Amount of Testing of Hydraulic Cement
ASTM C 566	Total Evaporable Moisture Content of Aggregate by Drying
ASTM D 75	Sampling Aggregates
ASTM D 979	Sampling Bituminous Paving Mixtures
ASTM D 995	Mixing Plants for Hot-Mixed Hot-Laid Bituminous Paving Mixtures
ASTM D 1073	Fine Aggregate for Bituminous Paving Mixtures
ASTM D 1074	Compressive Strength of Bituminous Mixtures
ASTM D 1188	Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D 1461	Moisture or Volatile Distillates in Bituminous Paving Mixtures
ASTM D 2041	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D 2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D 2419	Sand Equivalent Value of Soils and Fine Aggregate
ASTM D 2489	Estimating Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D 2726	Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D 2950	Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D 3203	Percent Air Voids in Compacted Dense and Open Bituminous Paving Mixtures
ASTM D 3665	Random Sampling of Construction Materials
ASTM D 3666	Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D 4125	Asphalt Content of Bituminous Mixtures by the Nuclear Method
ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4791	Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
ASTM D 4867	Effect of Moisture on Asphalt Concrete Paving Mixtures
ASTM D 5444	Mechanical Size Analysis of Extracted Aggregate
ASTM D 5581	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus (6" Diameter Specimen)
ASTM D 6926	Preparation of Bituminous Specimens Using MARSHALL Apparatus
ASTM D 6927	MARSHALL Stability and Flow of Bituminous Mixtures
ASTM E 11	Wire-Cloth Sieves for Testing Purposes
ASTM E 178	Dealing with Outlying Observations
AASHTO T 30	Mechanical Analysis of Extracted Aggregate
AASHTO T 110	Moisture or Volatile Distillates in Bituminous Paving Mixtures]
The Asphalt Institute's Manual No. 2 (MS-2)	Mix Design Methods for Asphalt Concrete

MATERIAL REQUIREMENTS

ASTM D 242	Mineral Filler for Bituminous Paving Mixtures
ASTM D 946	Penetration Graded Asphalt Cement for Use in Pavement Construction
ASTM D 3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM D 4552	Classifying Hot-Mix Recycling Agents
AASHTO MP1	Performance Graded Binder Designation

END OF ITEM P-403

ITEM P-501 PORTLAND CEMENT CONCRETE PAVEMENT

DESCRIPTION

501-1.1 This work shall consist of pavement composed of Portland cement concrete, **with reinforcement** constructed on a prepared underlying surface in accordance with these specifications and shall conform to the lines, grades, thickness, and typical cross sections shown on the plans.

MATERIALS

501-2.1 AGGREGATES.

a. Reactivity. Aggregates shall be tested for deleterious reactivity with alkalis in the cement, which may cause excessive expansion of the concrete. Separate tests of coarse and fine aggregate shall be made in accordance with ASTM C 1260. If the expansion of coarse or fine aggregate test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 28 days (30 days from casting), the coarse or fine aggregates shall be accepted.

If the expansion of any aggregate, coarse or fine, at 28 days is greater than 0.10%, tests of combined materials shall be made in accordance with ASTM C 1567 using the aggregates, cementitious materials, and/or specific reactivity reducing chemicals in the proportions proposed for the mixture design. If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C 1567, does not exceed 0.10 % at 28 days, the proposed combined materials will be accepted. If the expansion of the coarse and fine aggregate materials test specimens is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the cementitious materials can reduce the expansion to less than 0.10 % at 28 days, or new aggregates shall be evaluated and tested.

Any change in cement, aggregates or fly ash will require retesting in accordance with this paragraph.

(1). Initial Reactivity Testing:

(a) Fine and coarse aggregates shall be evaluated individually in accordance with ASTM C 1260. In addition, each aggregate source shall be evaluated separately. Testing shall be performed in accordance with the ASTM C 1260 method with the following modifications:

- Comparator readings shall be taken every 3 or 4 days and at 28 days after the zero reading.

Aggregates shall meet the requirements of this reactivity specification if individual tests have a measured expansion of less than 0.10 percent at 28 days. Should any of the test data indicate an expansion of greater than 0.10 percent, the aggregates shall be rejected or additional testing shall be performed by the Contractor in accordance with the reactivity mitigation testing protocol.

(2.) Reactivity Mitigation Testing : Mitigation testing shall include the individual aggregates, cementitious materials and / or specific reactivity reducing chemicals in the proportions proposed for the mix design.

(a) Fine and coarse aggregates shall be evaluated individually using ASTM C 1567 test. Testing shall be performed in accordance with ASTM C 1567 method with the following modifications:

- The test duration shall be extended to include a 28-day comparator reading.

- Comparator readings shall be taken every 3 or 4 days and at 28 days after the zero reading.

(b) If the use of Lithium Nitrate is employed to help mitigate the aggregate materials then the fine and coarse aggregates shall be evaluated individually using CRD-C-662 test method, "Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials, Lithium Nitrate Admixture and Aggregate (Accelerated Mortar-Bar Method)".

If any of the mitigation testing, does not lower the expansion to less than 0.10 percent at 28 days the aggregate(s) shall be rejected and the contractor shall submit new aggregate sources and retest. The results of testing shall be submitted to the Engineer for evaluation and acceptance.

Aggregates from different sources shall be weighed and batched separately at the concrete batch plant.

NO DIRECT PAYMENT SHALL BE MADE FOR MITIGATION. REACTIVITY MITIGATION SHALL BE INCIDENTAL TO ITEM P-501.

b. Fine Aggregate. Fine aggregate shall conform to the requirements of ASTM C 33. Fine aggregate is defined as clean granular material which passes an ASTM Number 4 Standard Sieve (#4 sieve) size and shall be a clean, hard and durable granular material that is natural sand, manufactured sand, or a combination of the two. Gradation shall meet the requirements of Table 1 when tested in accordance with ASTM C 136, except as may otherwise be qualified under Section 6 of ASTM C 33. However, the limits for the maximum allowable deleterious substances shall be reduced to one-half of the given values in ASTM C-33. The maximum limitation of the fineness modulus of 3.1 specified in ASTM C-33 is not applicable and may otherwise be qualified under Section 6 of ASTM C 33.be exceeded but may not exceed 3.4 without approval of the Engineer. The fineness modulus shall not be less than 2.3.

Table 1. Gradation for Fine Aggregate (ASTM C 33)

Sieve Designation (Square Openings)	Percentage by Weight Passing Sieves
3/8 in. (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 8 (2.36 mm)	80-100
No. 16 (1.18 mm)	50-85
No. 30 (600 µm)	25-60
No. 50 (300 µm)	10-30
No. 100 (150 µm)	2-10

c. Coarse Aggregate. Coarse aggregate shall conform to the requirements of ASTM C 33. Coarse aggregate is defined as that material retained on and above the Number 4 ASTM Standard Sieve (#4 sieve). The limits for the maximum allowable deleterious substances shall be reduced to one-half of the given values in ASTM C-33. No dolomite, dolostone or dolomitic limestone shall be acceptable as a coarse aggregate source, either crushed or gravel. No aggregate source containing more than 10% of dolomitic material shall be acceptable. Gradation, within the separated size groups, shall meet the requirements of Table 2 when tested in accordance with ASTM C 136. When the nominal maximum size of the aggregate is greater than 1 in, the aggregates shall be furnished in two size groups.

Aggregates delivered to the mixer shall consist of crushed stone, crushed or uncrushed gravel, air-cooled blast furnace slag, or a combination thereof. The aggregate shall be composed of clean, hard, uncoated particles and shall meet the requirements reduced to one-half for deleterious substances contained in ASTM C 33, Class 4S. Dust and other coating shall be removed from the aggregates by washing. The aggregate in any size group shall not contain more than 8 percent by weight of flat or elongated pieces when tested in accordance with ASTM D 4791. A flat or elongated particle is one having a ratio between the maximum and the minimum dimensions of a circumscribing rectangular prism exceeding 5 to 1.

The percentage of wear shall be no more than **40** when tested in accordance with ASTM C 131 or ASTM C 535.

Table 2 Gradation For Coarse Aggregate (ASTM C 33)

Sieve Designations (square openings)		Percentage by Weight Passing Sieves	
in	mm	#4 1 1/2" - ¾"	#67 ¾" - No. 4
2-1/2	63	---	---
2	50.8	100	---
1-1/2	38.1	90-100	---
1	25.0	20-55	100
3/4	19.0	0-15	90-100
1/2½	12.5	---	---
3/8	9.5	0-5	20-55
No. 4	4.75	---	0-10
No. 8	2.36	---	0-5

d. Aggregate susceptibility to Disintegration (D) Cracking. Aggregates that have a history of D-cracking shall not be used. Prior to approval of mixture design and production of Portland cement concrete the Contractor shall submit written certification that the aggregate does not have a history of D-Cracking and that the aggregate meets the specified State requirements.

(1) Other sources of crushed stone aggregate shall be approved if the durability factor as determined by ASTM C 666 is greater than or equal to 95 and all other quality test requirements within these specifications are fulfilled. The FAA will consider and reserves final approval of other State classification procedures.

(2) Crushed gravel and sand-gravel aggregates shall not be required to meet freeze-thaw durability ratings. These aggregates shall be approved for use in concrete by the state highway agency in the state from which the aggregate originates and the state in which they are to be used and shall meet all other criteria within these specifications.

e. Combined Aggregate Grading. To aid in the evaluation the mixture design, Workability and Coarseness Factors shall be developed. The Workability and Coarseness Factors shall be determined for the combined aggregate grading as follows:

(1.) Combined Aggregate Grading Controls. The coarse aggregate, blending sizes (when required), and fine aggregate shall be combined to be graded from the coarse to the fine aggregate sizes. Reports of grading shall include sieve sizes 2 inch, 1 ½ inch, 1 inch, ¾ inch, ½ inch, $^{3}/_{8}$ inch, and sieve sizes #4, #8, #16, #30, #50, and #100.

(2.) Workability and Coarseness Factors. The combined gradation shall be used to calculate a coarseness factor and workability factor.

1. The coarseness factor is defined as the percent of combined aggregate retained on the on the $^{3}/_{8}$ inch sieve divided by the percent of all the aggregate retained on the #8 sieve and multiplying the ratio by 100.
2. The workability factor is defined as the percentage of the combined aggregate finer than the #8 sieve. The workability factor is adjusted by 2.5 units for each 94 pounds per cubic yard of cementitious material above or below a mixture cementitious material content of 565 pounds per cubic yard. If the total cementitious material is 565 pounds per cubic yards, there is no adjustment.

The coarseness factor and the workability factor for each mixture shall be plotted on the Workability versus Coarseness Factor Chart shown in Figure 1. The concrete mixture proportion shall be accepted based on the following requirement: the plotted point of the coarseness factor and the workability factor for each mixture plotted on the Workability versus Coarseness Factor Chart shall be located within the area designated by the box ABCD in Figure 1.

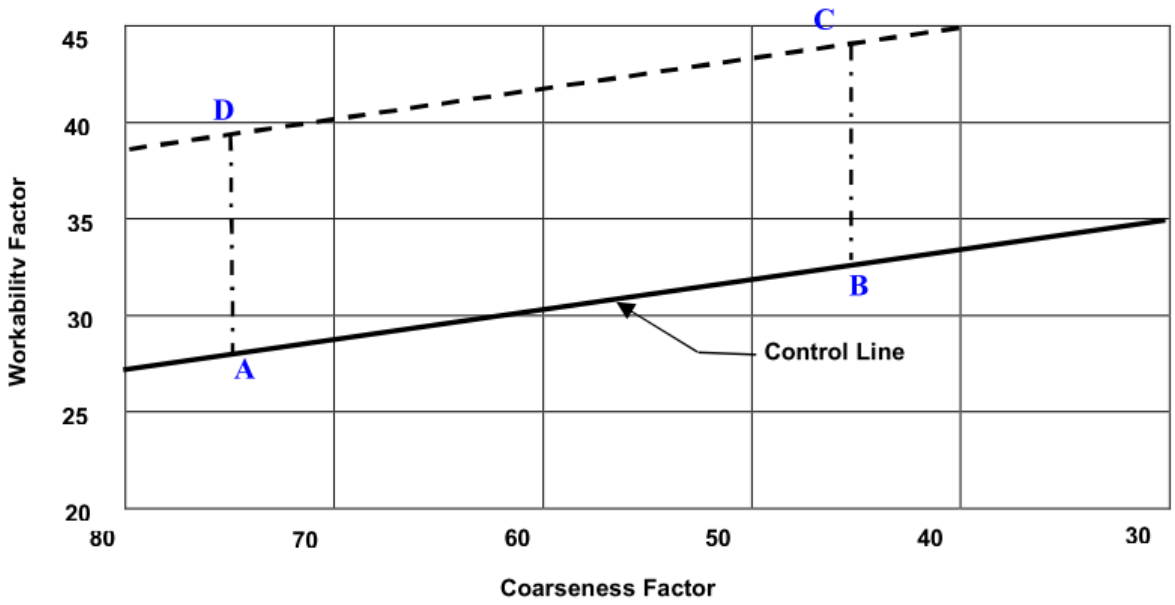

Figure 1: Workability versus Coarseness Factor Chart

In addition to the workability and coarseness factor chart, the Contractor shall also plot the combined aggregate gradation on a graph as the percentage retained for each reporting sieve size (y-axis) versus the sieve size (x-axis). For this graph, the following conditions shall be met:

1. The maximum peak on the percent retained chart shall be on a sieve larger than the ⅜ inch and shall be 2 or more points higher than any peak on a sieve smaller than the ⅜ inch sieve.

2. The sum of the percent retained of any two adjacent sieves on the percent retained chart shall be at 13 percent or more.

The plotted point shall not fall on nor in the proximity of the perimeter of the proposed limits. Given the standard variance of the aggregate stockpile gradations, points deemed too close to the proximity of the perimeter may provide a problem for control during production. If proportioning of the proposed aggregates can remedy the potential problem then an alternative gradation may be required. If proportioning adjustments do not provide a reasonable location for the point within the proposed perimeter then new aggregate materials may be required to replace or be included with the existing ones.

501-2.2 CEMENT. Cement shall conform to the requirements of ASTM **150** Type **I or II**.

If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

Only cements containing less than 0.6% equivalent alkali or cements that can demonstrate a positive reduction in the expansion created by alkali-silica reactions shall be used.

501-2.3 CEMENTITIOUS MATERIALS.

a. Fly Ash. Fly ash shall meet the requirements of ASTM C 618, Class F with the exception of loss of ignition, where the maximum shall be less than 6 percent. Fly ash for use in mitigating Alkali-Silica Reactivity shall have a Calcium Oxide (CaO) content of less than 13 percent and a total equivalent alkali content less than 3 percent. The supplementary optional chemical and physical properties of Table 3 contained in ASTM C 618 shall also apply. Fly ash such as is 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 C-618 reports for each source of fly ash proposed in the mix design, and shall furnish each additional report as they become available during the project. The Contractor shall furnish vendor's certified test reports for each shipment of Fly Ash used in the project. The reports can be used for acceptance or the material may be tested independently by the Engineer.

b. Blast Furnace Slag (Slag Cement). Ground Granulated Blast Furnace (GGBF) slag shall conform to ASTM C 989, Grade 100 or 120. GGBF shall be used only at a rate between 25 and 55 percent of the total cementitious material by mass. For blended cements designated as IS, the Portland cement proportion shall meet the requirements listed in section 2.2 above.

501-2.4 PREMOLDED JOINT FILLER. Premolded joint filler for expansion joints shall conform to the requirements of **ASTM D 1751** and shall be punched to admit the dowels where called for on the plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Engineer. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely by use of a Hilti IDP Insulation Anchor System or an equivalent plastic anchor system and held accurately. Other positive fastening means satisfactory to the Engineer may be requested.

501-2.5 JOINT SEALER. The joint sealer for the joints in the concrete pavement shall meet the requirements of Item P-604 and shall be of the type specified in the plans.

501-2.6 STEEL REINFORCEMENT. Reinforcing shall consist of steel wire fabric conforming to the requirements of ASTM A 185 or deformed steel bars conforming to the requirements of ASTM A 615, Grade 60.

501-2.7 DOWEL AND TIE BARS. Tie bars shall be deformed steel bars and conform to the requirements of ASTM A 615 or ASTM A 996, except that rail steel bars, Grade 50 or 60, shall not be used for tie bars that are to be bent or restraightened during construction. Tie bars designated as Grade 40 in ASTM A 615 can be used for construction requiring bent bars.

Dowel bars shall be plain steel bars conforming to ASTM A 615 or ASTM A 966 and shall be free from burring or other deformation restricting slippage in the concrete. High strength dowel bars shall conform to ASTM A 714, Class 2, Type S, Grade I, II or III, Bare Finish. Before delivery to the construction site each dowel bar shall be painted with one coat of paint conforming to MIL-DTL-24441/20A. SSPC Paint 5 or SSPC Paint 25. Metal or plastic collars shall be full circular device supporting the dowel until the epoxy hardens.

The sleeves for dowel bars used in expansion joints shall be metal or other type of an approved design to cover 2 to 3 in (50 mm to 75 mm) of the dowel, with a closed end and with a suitable stop to hold the end of the bar at least 1 in (25 mm) from the closed end of the sleeve. Sleeves shall be of such design that they will not collapse during construction.

501-2.8 WATER. Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water will be tested in accordance with the requirements of AASHTO T 26. Water known to be of potable quality may be used without testing.

501-2.9 COVER MATERIAL FOR CURING. Curing materials shall conform to one of the following specifications:

a. Liquid membrane-forming compounds for curing concrete shall conform to the requirements of ASTM C 309, Type 2, Class B, or Class A if wax base only.

b. White polyethylene film for curing concrete shall conform to the requirements of ASTM C 171.

c. White burlap-polyethylene sheeting for curing concrete shall conform to the requirements of ASTM C 171.

d. Waterproof paper for curing concrete shall conform to the requirements of ASTM C 171.

501-2.10 ADMIXTURES. The use of any material added to the concrete mix shall be approved by the Engineer. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer 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 Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-Entraining Admixtures. Air-entraining admixtures shall meet the requirements of ASTM C 260 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. Chemical Admixtures. Water-reducing, set retarding, and set-accelerating admixtures shall meet the requirements of ASTM C 494, including the flexural strength test. Chemical admixtures shall be compatible with other mixture components. The addition of the admixtures shall not result in a chemical reaction or change in physical properties of the concrete mixture that are adverse to pavement quality concrete. Calcium chloride and admixtures containing calcium chloride shall not be used in any case.

c. Lithium Nitrate Admixture. If required, lithium nitrate admixtures used for control of deleterious expansion from ASR shall meet the specifications described in the AASHTO Guide Specifications for Highway Construction, Section 713.04 Lithium Admixtures (LiNO3 aqueous admixture) and shall also meet the requirements described in Section 501-2.1,a.(2).

501-2.11 EPOXY-RESIN. Epoxy-resin used to anchor dowels and tie bars in pavements shall conform to the requirements of ASTM C 881, Type I, Grade 3, Class C. Class A or B shall be used when the surface temperature of the hardened concrete is below 60 °F (16 °C).

501-2.12 MATERIAL ACCEPTANCE. Prior to use of materials, the Contractor shall submit certified test reports to the Engineer for those materials proposed for use during construction. The certification shall show the appropriate ASTM test for each material, the test results, and a statement that the material passed or failed.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

For aggregate and concrete mixtures to be used on the project, the pre-construction certifications, except for aggregates tested for aggregate reactivity mitigation (Section 501-2.1.a.(2)), developed using materials sampled not more than 120 days before the start of concrete placement are acceptable. The certification for aggregates tested for aggregate reactivity mitigation (Section 501-2.1.a.(2)) shall be for aggregates sampled not more than 60 days before the start of concrete placement.

MIX DESIGN

501-3.1 PROPORTIONS. Concrete shall be designed to achieve a 28-day flexural strength that meets or exceeds the acceptance criteria contained in paragraph 501-5.2 for a flexural strength of **650** psi. The mix shall be designed using the procedures contained in Chapter 9 of the Portland Cement Association's manual, "Design and Control of Concrete Mixtures".

The Contractor shall note that to ensure that the concrete actually produced will meet or exceed the acceptance criteria for the specified strength, the mix design average strength must be higher than the specified strength. The amount of overdesign necessary to meet specification requirements depends on the producer's standard deviation of flexural test results and the accuracy that that value can be estimated from historic data for the same or similar materials.

The minimum cementitious material (cement plus fly ash, or GGBFS) shall be **564** pounds per cubic yard. The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall not be more than **0.45 nor less than 0.40** by weight.

Prior to the start of paving operations and after approval of all material to be used in the concrete, the Contractor shall submit a mix design showing the proportions and flexural strength obtained from the concrete at 7 and 28 days. The mix design shall include copies of test reports, including test dates, and a complete list of materials including type, brand, source, and amount of cement, fly ash, ground slag, coarse aggregate, fine aggregate, water, and admixtures. The fineness modulus of the fine aggregate and the air content shall also be shown. The mix design shall be submitted to the Engineer at least **20** days prior to the start of operations. The submitted mix design shall not be more than 90 days old. Production shall not begin until the mix design is approved in writing by the Engineer.

Should a change in sources be made, or admixtures added or deleted from the mix, a new mix design must be submitted to the Engineer for approval.

Flexural strength test specimens shall be prepared in accordance with ASTM C 192 and tested in accordance with ASTM C 78. The mix determined shall be workable concrete having a slump for side-form concrete between 1 and 2 in (25 mm and 50 mm) as determined by ASTM C 143. For vibrated slip-form concrete, the slump shall be between 1/2 in (13 mm) and 1 1/2 in (38 mm).

501-3.2 CEMENTITIOUS MATERIALS.

a. Fly ash. Fly ash may be used in the mix design. When fly ash is used as a partial replacement for cement, the minimum cement content may be met by considering Portland cement plus fly ash as the total cementitious material. The replacement rate shall be determined from laboratory trial mixes, but shall be between 20 and 30 percent by weight of the total cementitious material. If fly ash is used in conjunction with ground granular blast furnace slag the maximum replacement rate shall not exceed 10 percent by weight of total cementitious material.

b. Ground Slag. Ground blast-furnace slag may be used in a mix design containing Type I or Type II cement. The slag, or slag plus fly ash if both are used, may constitute between 25 to 55 percent of the total cementitious material by weight. If the concrete is to be used for slipforming operations and the air temperature is expected to be lower than 55 °F anytime within 3 days after the initial placement, the percent slag shall not exceed 30 percent by weight.

501-3.3 ADMIXTURES.

a. Air-Entraining. Air-entraining admixture shall be added in such a manner that will insure uniform distribution of the agent throughout the batch. The air content of freshly mix air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be **6.0%**. Air content shall be determined by testing in accordance with ASTM C 231 for gravel and stone coarse aggregate and ASTM C 173 for slag and other highly porous coarse aggregate.

b. Chemical. Water-reducing, set-controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, in accordance with ASTM C 494.

c. Lithium Nitrate. If addition of lithium nitrate is required to mitigate deleterious expansion from ASR it shall be added in the appropriate amounts such that the requirements set forth in Item 501-2.1 Aggregates, a. Reactivity are met.

501-3.4 PERMEABILITY. One of the following concrete permeability related requirements shall be met:

a. Concrete shall have a maximum rating of 2000 coulombs at 28 days when tested in accordance with ASTM C 1202. The concrete specimen shall be cured under accelerated curing conditions as follows: The cylinders shall be initially cured for one week in accordance with ASTM C31/C31M or ASTM C 192/C 192M. The cylinders shall then be cured for 3 weeks in lime-saturated water at 100 degrees F, plus or minus 3 degrees F.

b. Concrete shall have a maximum of 13 percent permeable voids measured in accordance with ASTM C 642.

501-3.5 CONCRETE MIX DESIGN LABORATORY. The Contractor's laboratory used to develop the concrete mix design shall meet the requirements of ASTM C 1077 and ASTM C 78. The accreditation shall be current and include the required and optional test methods, as specified throughout this section. . The laboratory accreditation must be current and listed on the accrediting authority's website and shall be maintained this certification for the duration of the project. . All test methods required for developing the concrete mix design must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

501-3.6 TEST BATCH. At least 30 days prior to the start of production the contractor and/or producer shall prepare a Test Batch under the observation of the Engineer. The Test Batch shall be prepared at the concrete plant proposed for use in the production of the concrete mix for the project and the test batch proportions shall be in accordance with the approved mixture for the contractor's predominate method of proposed placement. The plant shall have been surveyed and reviewed by the Engineer, or his or her designated representative, prior to preparation of the Test Batch. As required by these Specificatons, the Contractor shall provide all Quality Control for production of the concrete. The Test Batch shall be prepared as follows:

(1) Proportioning. The Contractor shall proportion the plant in accordance with Section 501-6.1, "Contractor Quality Control Program" prior to preparation of the mix.

(2) Preparation of the Mix.

A. Prepare a minimum Test Batch of at least four (4) cubic yards of concrete in accordance with the accepted mixture.

B. Mixing.

1. Stationary Plant: Minimum of 90 seconds unless historical plant data or the uniformity test demonstrates otherwise.
2. Transit Mixer: 70-100 Revs. @ 5-16 RPM

C. After initial mixing, agitate mix at 2-5 RPM for the approximate time anticipated from when the water contacts the cement and deposit of the concrete in the forms.

D. Check slump and air. If the air content is approximately equal to the designated percent and the slump is approximately equal to the designated slump, the Contractor Quality Control Lab will make beams for testing while the Engineer observes. Beams will be made for testing when the designated slump is obtained at approximately the designated percent air content.

E. The concrete test beams shall be tested at 3, 7, 14 and 28 days to establish a growth curve of concrete strength vs. age.

(3) The Test Batch shall be considered incidental to the concrete paving and included in the price per square yard for concrete pavement paid for under Section 501-8.1.

CONSTRUCTION METHODS

501-4.1 EQUIPMENT. Equipment necessary for handling materials and performing all parts of the work shall be approved by the engineer as to design, capacity, and mechanical conditions. The equipment shall be at the jobsite sufficiently ahead of the start of paving operations to be examined thoroughly and approved.

a. Batch Plant and Equipment. The batch plant and equipment shall conform to the requirements of ASTM C 94.

b. Mixers and Transportation Equipment.

(1) General. Concrete may be mixed at a central plant, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer's nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

(2) Central plant mixer. Central plant mixers shall conform to the requirements of ASTM C 94. The mixer shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 in (19 mm) or more. The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

(3) Truck mixers and truck agitators. Truck mixers used for mixing and hauling concrete and truck agitators used for hauling central-mixed concrete shall conform to the requirements of ASTM C 94.

(4) Nonagitator trucks. Nonagitating hauling equipment shall conform to the requirements of ASTM C 94.

c. Finishing Equipment. The standard method of constructing concrete pavements on FAA projects shall be with an approved slip-form paving equipment designed to spread, consolidate, screed, and float-finish the freshly placed concrete in one complete pass of the machine so a dense and homogeneous pavement is achieved with a minimum of hand finishing. The paver-finisher shall be a heavy duty, self-propelled machine designed specifically for paving and finishing high quality concrete pavements. It shall weigh at least 2200 lbs. per foot of paving lane width and powered by an engine having at least 6.0 horsepower per foot of lane width.

On projects requiring less than 500 sq yd of cement concrete pavement or requiring individual placement areas of less than 500 sq yd, or irregular areas at locations inaccessible to slip-form paving equipment, cement concrete pavement may be placed with approved placement and finishing equipment using stationary side forms. Hand screeding and float finishing may only be used on small irregular areas as allowed by the Engineer.

d. Vibrators. Vibrator shall be the internal type. Operating frequency for internal vibrators shall be between 8,000 and 12,000 vibrations per minute. Average amplitude for internal vibrators shall be 0.025-0.05 in (0.06 - 0.13 cm).

The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement and meet the recommendations of ACI 309, Guide for Consolidation of Concrete. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases. The contractor shall provide an electronic or mechanical means to monitor vibrator status. The checks on vibrator status shall occur a minimum of two times per day or when requested by the Engineer.

Hand held vibrators may be used in irregular areas only, but shall meet the recommendations of ACI 309, Guide for Consolidation of Concrete.

e. Concrete Saws. The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations.

f. Side Forms. Straight side forms shall be made of steel and shall be furnished in sections not less than 10 feet (3 m) in length. Forms shall have a depth equal to the pavement thickness at the edge, and a base width equal to or greater than the depth. Flexible or curved forms of proper radius shall be used for curves of 100 ft (31 m) radius or less. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8 in (3 mm) in 10 ft (3 m), and the upstanding leg shall not vary more than 1/4 in (6 mm). The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the Engineer.

g. Pavers. The paver shall be fully energized, self-propelled, and designed for the specific purpose of placing, consolidating, and finishing the concrete pavement, true to grade, tolerances, and cross section. It shall be of sufficient weight and power to construct the maximum specified concrete paving lane width as shown in the plans, at adequate forward speed, without transverse, longitudinal or vertical instability or without displacement. The paver shall be equipped with electronic or hydraulic horizontal and vertical control devices.

501-4.2 FORM SETTING. Forms shall be set sufficiently in advance of the concrete placement to insure continuous paving operation. After the forms have been set to correct grade, the underlying surface shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place sufficiently to maintain the form in position for the method of placement.

Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/8 in (3 mm) at any joint. Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the placing of concrete.

The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete.

501-4.3 CONDITIONING OF UNDERLYING SURFACE. The compacted underlying surface on which the pavement will be placed shall be widened approximately 3 ft (1 m) to extend beyond the paving machine track to support the paver without any noticeable displacement. After the underlying surface has been placed and compacted to the required density, the areas that will support the paving machine and the area to be paved shall be trimmed or graded to the plan grade elevation and profile by means of a properly designed machine. The grade of the underlying surface shall be controlled by a positive grade control system using lasers, stringlines, or guide wires. If the density of the underlying surface is disturbed by the trimming operations, it shall be corrected by additional compaction and retested at the option of the Engineer before the concrete is placed except when stabilized subbases are being constructed. If damage occurs on a stabilized subbase, it shall be corrected full depth by the Contractor. If traffic is allowed to use the prepared grade, the grade shall be checked and corrected immediately before the placement of concrete. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete. The underlying surface shall be protected so that it will be entirely free of frost when concrete is placed.

501-4.4 CONDITIONING OF UNDERLYING SURFACE, SIDE-FORM AND FILL-IN LANE CONSTRUCTION. The prepared underlying surface shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from the concrete. Damage caused by hauling or usage of other equipment shall be corrected and retested at the option of the Engineers. If damage occurs to a stabilized subbase, it shall be corrected full depth by the Contractor. A template shall be provided and operated on the forms immediately in advance of the placing of all concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they may be set and maintained at the correct contour of the underlying surface. The adjustment and operation of the templates shall be such as will provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed and wasted. Low areas shall be filled and compacted to a condition similar to that of the surrounding grade. The underlying surface shall be protected so that it will be entirely free from frost when the concrete is placed. The use of chemicals to eliminate frost in the underlying surface shall not be permitted.
The template shall be maintained in accurate adjustment, at all times by the Contractor, and shall be checked daily.

501-4.5 HANDLING, MEASURING, AND BATCHING MATERIAL. The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials.

Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit free drainage.

Batching plants shall be equipped to proportion aggregates and bulk cement, by weight, automatically using interlocked proportioning devices of an approved type. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper to transporting container or into the batch itself for transportation to the mixer, such as a chute, boot, or other approved device, to prevent loss of cement. The device shall be arranged to provide positive assurance that the cement content specified is present in each batch.

501-4.6 MIXING CONCRETE. The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials, except water, are emptied into the drum. All concrete shall be mixed and delivered to the site in accordance with the requirements of ASTM C 94.

Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or non-agitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is deposited in place at the work site shall not exceed 30 minutes when the concrete is hauled in non-agitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. Retempering concrete by adding water or by other means will not be permitted. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the water/cementitious ratio specified in the approved mix design is not exceeded, and approved by the Engineer.

Concrete mixer uniformity tests shall be conducted on central mix plants and truck mixers before production of the project concrete. Uniformity tests shall also be conducted for all batch plants that are moved.

Criteria for mixer uniformity in accordance with ASTM C 94/C 94M shall be met.

The number of revolutions for truck-mixed and shrink-mixed concrete shall be determined by uniformity tests in accordance with ASTM C 94/C 94M.

Every load of concrete delivered to the paving site shall have a batch ticket indicating all of the information identified in the NRMCA QC3 document for batch tickets. Batch tickets for central-mixed concrete delivered in trucks that do not have the capability of adding water may be retained at the plant and delivered to the Engineer daily.

501-4.7 LIMITATIONS ON MIXING AND PLACING. No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

a. Cold Weather. Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40 °F (4 °C) and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35 °F (2 °C).

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50 °F (10 °C) at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150 °F (66 °C). The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

b. Hot Weather. During periods of hot weather when the maximum daily air temperature exceeds 85 °F (30 °C), the following precautions shall be taken.

The forms and/or the underlying surface shall be sprinkled with water immediately before placing the concrete. The concrete shall be placed at the coolest temperature practicable, and in no case shall the temperature of the concrete when placed exceed 90° F (35 °C). The aggregates and/or mixing water shall be cooled as necessary to maintain the concrete temperature at or not more than the specified maximum.

The finished surfaces of the newly laid pavement shall be kept damp by applying a water-fog or mist with approved spraying equipment until the pavement is covered by the curing medium. If necessary, wind screens shall be provided to protect the concrete from an evaporation rate in excess of 0.2 psf per hour as determined in accordance with Figure 2.1.5 in ACI 305R, Hot Weather Concreting, which takes into consideration relative humidity, wind velocity, and air temperature.

When conditions are such that problems with plastic cracking can be expected, and particularly if any plastic cracking begins to occur, the Contractor shall immediately take such additional measures as necessary to protect the concrete surface. Such measures shall consist of wind screens, more effective fog sprays, and similar measures commencing immediately behind the paver. If these measures are not effective in preventing plastic cracking, paving operations shall be immediately stopped.

c. Temperature Management Program. Prior to the start of paving operation for each day of paving, the contractor shall provide the engineer with a Temperature Management Program for the concrete to be placed to assure that uncontrolled cracking is avoided. As a minimum the program shall address the following items:

1) Anticipated tensile strains in the fresh concrete as related to heating and cooling of the concrete material.

2) Anticipated weather conditions such as ambient temperatures, wind velocity, and relative humidity.

3) Anticipated timing of initial sawing of joint.

4) In addition to specified items mention here, the Contractor's Weather Management Plan shall specifically address mixing requirements, hauling requirements, placing requirements, and protection of concrete. The requirements shall incorporate the applicable recommendations of ACI 306 – Cold Weather Concreting and ACI 305 – Hot Weather Concreting.

d. Protecting Concrete from Rain Damage. The Contractor's Weather Management Plan shall include provisions to protect freshly placed concrete form rain damage. If rain appears imminent, the contractor shall not place concrete. The Contractor shall keep on-site sufficient water proof material and means to rapidly place the waterproof material over all unhardened concrete surface that may be damaged by rain. Concrete shall not be placed during rain that results in any standing water on the surface of the fresh concrete surface.

The Contractor shall not attempt to remove any rainwater from the unhardened concrete surface prior to application of the waterproof material. The Contractor shall also not manually finish or texture the freshly place concrete if there is any rainwater on the concrete surface. At the end of the rainstorm, the Contractor shall remove the waterproof material, allow any standing rainwater to evaporate, and apply curing material.

Rain-damaged concrete shall be cored as directed by the Engineer and depth of damage determined by petrographic examination. The Contractor shall be responsible for the costs associated with the coring and testing. If the depth of damage is ¼ inch or less of the pavement thickness, the damaged area may be corrected by diamond grinding as directed by the Engineer. If the damage is greater that ¼ inch of the pavement thickness, the slab shall be considered defective and replaced in accordance with paragraph 501-4.19 REPAIR, REMOVAL, and REPLACEMENT OF SLABS. If light cans are in the affected area and grinding will cause the light to exceed tolerances, the affected area shall be removed in accordance with paragraph 501-4.19. Ponding of water created by grinding will not be allowed.

e. Documentation of Weather Data. The Contractor shall provide a continuous and accurate record of air temperature, relative humidity, concrete temperature and wind velocity at the project site with portable weather station, adjacent to paving areas(s). The data shall be collected and documented by the Contractor continuously for the full duration of the project. The Contractor's quality control staff shall document the weather data in the daily Quality Control Reports and use and implement the data to eliminate the potential for plastic cracking of Portland cement concrete pavement by estimation the evaporation rate from Figure 4.2 "Effect of concrete and air temperatures, relative humidity, and wind speed on the rate of evaporation of surface moisture from concrete" as indicated in ACI 305R.

501-4.8 PLACING CONCRETE. The Contractor has the option of placing the concrete with either side (fixed) forms or slip-forms. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3 ft (1 m). Backhoes and Grading equipment shall not be used to distribute the concrete in front of the paver. Front end loaders will not be used unless the contractor demonstrates that they can be used without contaminating the concrete and base course and it is approved by the Engineer. Prior to paving, the Contractor shall verify that all proposed underground facilities are installed and the Contractor shall submit a detailed plan and placement schedule including dates for each paving pass. Updates to the schedule shall be submitted 48-hours prior to actual paving of each pass. All proposed electrical conduits shall be mandreled prior to concrete paving. The elevations and tolerances of the P-304 CTB base materials shall be confirmed to be within the contractual tolerances prior to paving.

Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed pavement when the concrete strength reaches **a flexural strength of 550 psi**, based on the average of four field cured specimens per 2,000 cubic yards (1,530 cubic meters) of concrete placed. Also, subgrade and subbase planers, concrete pavers, and concrete finishing equipment may be permitted to ride upon the edges of previously constructed pavement when the concrete has attained a minimum flexural strength of 400 psi. Testing associated with the determination of equipment access shall be by the contractor's lab at the contractor's expense.

a. Slip-Form Construction. The concrete shall be distributed uniformly into final position by a self propelled slip-form paver without delay. The alignment and elevation of the paver shall be regulated from outside reference lines established for this purpose. The paver shall vibrate the concrete for the full width and depth of the strip of pavement being placed and the vibration shall be adequate to provide a consistency of concrete that will stand normal to the surface with sharp well defined edges. The sliding forms shall be rigidly held together laterally to prevent spreading of the forms.

The plastic concrete shall be effectively consolidated by internal vibration with transverse vibrating units for the full width of the pavement and/or a series of equally placed longitudinal vibrating units. The space from the outer edge of the pavement to longitudinal unit shall not exceed 9 in. The spacing of internal units shall be uniform and shall not exceed 18 in.

The term internal vibration means vibrating units located within the specified thickness of pavement section.

The rate of vibration of each vibrating unit shall be within 8000 to 12000 cycles per minute and the amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete along the entire length of the vibrating unit and for a distance of at least 1 ft. The frequency of vibration or amplitude shall vary proportionately with the rate of travel to result in a uniform density and air content. The paving machine shall be equipped with a tachometer or other suitable device for measuring and indicating the actual frequency of vibrations.

The concrete shall be held at a uniform consistency. The slip-form paver shall be operated with as nearly a continuous forward movement as possible. And all operations of mixing, delivering, and spreading concrete shall be coordinated to provide uniform progress with stopping and starting of the paver held to a minimum. If for any reason, it is necessary to stop the forward movement of the paver, the vibratory and tamping elements shall also be stopped immediately. No tractive force shall be applied to the machine, except that which is controlled from the machine.

When concrete is being placed adjacent to an existing pavement, that part of the equipment which is supported on the existing pavement shall be equipped with protective pads on crawler tracks or rubber-tired wheels on which the bearing surface is offset to run a sufficient distance from the edge of the pavement to avoid breaking the pavement edge.

b. Side-Form Construction. Side form sections shall be straight, free from warps, bends, indentations, or other defects. Defective forms shall be removed from the work. Metal side forms shall be used except at end closures and transverse construction joints where straight forms of other suitable material may be used.

Side forms may be built up by rigidly attaching a section to either top or bottom of forms. If such build-up is attached to the top of metal forms, the build-up shall also be metal.

Width of the base of all forms shall be equal to at least 80 percent of the specified pavement thickness. The dimensions of all forms shall meet the requirements of paragraph 501-4.1 f. Side Forms.

Side forms shall be of sufficient rigidity, both in the form and in the interlocking connection with adjoining forms, that springing will not occur under the weight of subgrading and paving equipment or from the pressure of the concrete. The Contractor shall provide sufficient forms so that there will be no delay in placing concrete due to lack of forms.

Before placing side forms, the underlying material shall be at the proper grade. Side forms shall have full bearing upon the foundation throughout their length and width of base and shall be placed to the required grade and alignment of the finished pavement. They shall be firmly supported during the entire operation of placing, compacting, and finishing the pavement.

Forms shall be drilled in advance of being placed to line and grade to accommodate tie bars where these are specified.

Immediately in advance of placing concrete and after all subbase operations are completed, side forms shall be trued and maintained to the required line and grade for a distance sufficient to prevent delay in placing.

Side forms shall remain in place at least 12 hours after the concrete has been placed, and in all cases until the edge of the pavement no longer requires the protection of the forms. Curing compound shall be applied to the concrete immediately after the forms have been removed.

Side forms shall be thoroughly cleaned and oiled each time they are used and before concrete is placed against them.

Concrete shall be spread, screeded, shaped and consolidated by one or more self-propelled machines. These machines shall uniformly distribute and consolidate concrete without segregation so that the completed pavement will conform to the required cross section with a minimum of handwork.

The number and capacity of machines furnished shall be adequate to perform the work required at a rate equal to that of concrete delivery.

Concrete for the full paving width shall be effectively consolidated by internal vibrators without causing segregation. Internal type vibrators' rate of vibration shall be not less than 7,000 cycles per minute. Amplitude of vibration shall be sufficient to be perceptible on the surface of the concrete more than 1 ft from the vibrating element. The Contractor shall furnish a tachometer or other suitable device for measuring and indicating frequency of vibration.

Power to vibrators shall be connected so that vibration ceases when forward or backward motion of the machine is stopped.

The provisions relating to the frequency and amplitude of internal vibration shall be considered the minimum requirements and are intended to ensure adequate density in the hardened concrete.

c. Consolidation Testing. The provisions relating to the frequency and amplitude of internal vibration shall be considered the minimum requirements and are intended to ensure adequate density in the hardened concrete. If a lack of consolidation of the concrete is suspected by the Engineer, additional referee testing may be required. Referee testing of hardened concrete will be performed by cutting cores from the finished pavement after a minimum of 24 hours curing. Density determinations will be made based on the water content of the core as taken. ASTM C 642 shall be used for the determination of core density in the saturated-surface dry condition. Referee cores will be taken at the minimum rate of one for each 500 cubic yards of pavement, or fraction thereof.

The average density of the cores shall be at least 97 percent of the original mix design density, with no cores having a density of less than 96 percent of the original mix design density.

Failure to meet the above requirements will be considered as evidence that the minimum requirements for vibration are inadequate for the job conditions, and additional vibrating units or other means of increasing the effect of vibration shall be employed so that the density of the hardened concrete as indicated by further referee testing shall conform to the above listed requirements.

501-4.9 STRIKE-OFF OF CONCRETE AND PLACEMENT OF REINFORCEMENT. Following the placing of the concrete, it shall be struck off to conform to the cross section shown on the plans and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable ASTM specification requirements.

501-4.10 JOINTS. Joints shall be constructed as shown on the plans and in accordance with these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the plans. Joints shall not vary more than 1/2 in (13 mm) from their designated position and shall be true to line with not more than 1/4 in (6 mm) variation in 10 ft (3 m). The surface across the joints shall be tested with a 10 ft (3 m) straightedge as the joints are finished and any irregularities in excess of 1/4 in (6 mm) shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the plans.

a. Construction. Longitudinal construction joints shall be slip-formed or formed against side forms with or without keyways, as shown in the plans.

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.

b. Contraction. Contraction joints shall be installed at the locations and spacing as shown on the plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 in (3 mm) wide and to the depth shown on the plans.

c. Expansion. Expansion joints shall be installed as shown on the plans. The premolded filler of the thickness as shown on the plans, shall extend for the full depth and width of the slab at the joint, except for space for sealant at the top of the slab. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface. A cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete has been placed and struck off, the cap shall be carefully withdrawn leaving the space over the premolded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic. Any concrete bridging the joint space shall be removed for the full width and depth of the joint.

d. Tie bars. Tie bars shall consist of deformed bars installed in joints as shown on the plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the plans. They shall be held in position parallel to the pavement surface and in the middle of the slab depth. When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. These bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed in the female side of the keyed joint provided the installation is made without distorting the keyed dimensions or causing edge slump. If a bent tie bar installation is used, the tie bars shall be inserted through the keyway liner only on the female side of the joint. In no case shall a bent tie bar installation for male keyways be permitted.

e. Dowel bars. Dowel bars or other load-transfer units of an approved type shall be placed across joints in the manner as shown on the plans. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. A metal, or other type, dowel expansion cap or sleeve shall be furnished for each dowel bar used with expansion joints. These caps shall be substantial enough to prevent collapse and shall be placed on the ends of the dowels as shown on the plans. The caps or sleeves shall fit the dowel bar tightly and the closed end shall be watertight. The portion of each dowel painted with rust preventative paint, as required under paragraph 501-2.7 and shown on the plans to receive a debonding lubricant, shall be thoroughly coated with asphalt MC-70, or an approved lubricant, to prevent the concrete from bonding to that portion of the dowel. If free-sliding plastic-coated or epoxy-coated steel dowels are used, a lubrication bond breaker shall be used except when approved pullout tests indicate it is not necessary. Where butt-type joints with dowels are designated, the exposed end of the dowel shall be oiled.

Dowel bars at contraction joints may be placed in the full thickness of pavement by a mechanical device approved by the Engineer. The device shall be capable of installing dowel bars within the maximum permissible alignment tolerances. Dowels bars at longitudinal construction joints shall be bonded in drilled holes.

f. Installation. All devices used for the installation of expansion joints shall be approved by the Engineer.

The top of an assembled joint device shall be set at the proper distance below the pavement surface and the elevation shall be checked. Such devices shall be set to the required position and line and shall be securely held in place by stakes or other means to the maximum permissible tolerances during the pouring and finishing of the concrete. The premolded joint material shall be placed and held in a vertical position; if constructed in sections, there shall be no offsets between adjacent units.

Dowel bars and assemblies shall be checked for position and alignment. The maximum permissible tolerances on dowel bar alignment shall be in accordance with paragraph 501-5.2e(6). During the concrete placement operation, it is advisable to place plastic concrete directly on dowel assemblies immediately prior to passage of the paver to help maintain dowel position and alignment within maximum permissible tolerances.

When concrete is placed using slip-form pavers, dowels and tie bars shall be placed in longitudinal construction joints by bonding the dowels or tie bars into holes drilled into the hardened concrete. Holes approximately 1/8 in to 1/4 in (3 to 6 mm) greater in diameter than the dowel or tie bar shall be drilled with rotary-type core drills that must be held securely in place to drill perpendicularly into the vertical face of the pavement slab. Rotary-type percussion drills may be used provided that spalling of concrete does not occur. Any damage of the concrete shall be repaired by the Contractor in a method approved by the Engineer. Dowels or tie bars shall be bonded in the drilled holes using an epoxy resin material. Installation procedures shall be adequate to insure that the area around dowels is completely filled with epoxy grout. Epoxy shall be injected into the back of the hole and displaced by the insertion of the dowel bar. Bars shall be completely inserted into the hole and shall not be withdrawn and reinserted creating air pockets in the epoxy around the bar. The Contractor shall furnish a template for checking the position and alignment of the dowels. Dowel bars shall not be less than 10 in (25 cm) from a transverse joint and shall not interfere with dowels in the transverse direction.

g. Sawing of Joints. Joints shall be cut as shown on the plans. Equipment shall be as described in paragraph 501-4.1. The circular cutter shall be capable of cutting a groove in a straight line and shall produce a slot at least 1/8 in (3 mm) wide and to the depth shown on the plans. The top portion of the slot shall be widened by sawing to provide adequate space for joint sealers as shown on the plans. Sawing shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs. Sawing shall be carried on both during the day and night as required. The joints shall be sawed at the required spacing, consecutively in sequence of the concrete placement. Curing compound, if being used as the cure type, shall be reapplied in the initial sawcut and maintained for the remaining cure period. Curing compound shall not be applied, and used as the cure method, to any final concrete face that is to receive a sealant. All slurry and debris produced in the sawing of joints shall be removed by vacuuming and washing.

h. Bulkhead Construction Joints. Bulkhead construction joint will not be allowed. The Contractor shall pave a minimum of two feet beyond planned construction joints and then saw back to the planned joint location. A doweled construction joint shall then be constructed in accordance with the plans. No keyways shall be allowed. Deep saw cutting bulkheads and disposing of the excess concrete will not be measured for direct payment.

501-4.11 FINAL STRIKE-OFF, CONSOLIDATION, AND FINISHING.

a. Sequence. The sequence of operations shall be the strike-off, floating and removal of laitance, straightedging, and final surface finish. The addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted.

b. Finishing at Joints. The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material; it shall be firmly placed without voids or segregation under and around all load-transfer devices, joint assembly units, and other features designed to extend into the pavement. Concrete adjacent to joints shall be mechanically vibrated as required in paragraph 501-4.8.a. After the concrete has been placed and vibrated adjacent to the joints, the finishing machine shall be operated in a manner to avoid damage or misalignment of joints. If uninterrupted operations of the finishing machine, to, over, and beyond the joints, cause segregation of concrete, damage to, or misalignment of the joints, the finishing machine shall be stopped when the screed is approximately 8 in (20 cm) from the joint. Segregated concrete shall be removed from the front of and off the joint; and the forward motion of the finishing machine shall be resumed. Thereafter, the finishing machine may be run over the joint without lifting the screed, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.

c. Machine Finishing. The concrete shall be spread as soon as it is placed, and it shall be struck off and screeded by a finishing machine. The machine shall go over each area as many times and at such intervals as necessary to give to proper consolidation and to leave a surface of uniform texture. Excessive operation over a given area shall be avoided. When side forms are used, the tops of the forms shall be kept clean by an effective device attached to the machine, and the travel of the machine on the forms shall be maintained true without lift, wobbling, or other variation tending to affect the precision finish. During the first pass of the finishing machine, a uniform ridge of concrete shall be maintained ahead of the front screed for its entire length. When in operation, the screed shall be moved forward with a combined longitudinal and transverse shearing motion, always moving in the direction in which the work is progressing, and so manipulated that neither end is raised from the side forms during the striking-off process. If necessary, this shall be repeated until the surface is of uniform texture, true to grade and cross section, and free from porous areas.

d. Hand Finishing. Hand finishing methods will not be permitted, except under the following conditions: in the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade; in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical. Concrete, as soon as placed, shall be struck off and screeded. An approved portable screed shall be used. A second screed shall be provided for striking off the bottom layer of concrete when reinforcement is used.

The screed for the surface shall be a least 2 feet (0.6 m) longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and shall be constructed either of metal or of other suitable material covered with metal. Consolidation shall be attained by the use of suitable vibrators.

e. Floating. After the concrete has been struck off and consolidated, it shall be further smoothed and trued by means of a longitudinal float using one of the following methods:

(1) Hand Method. Long-handled floats shall not be less than 12 feet (3.6 m) in length and 6 in (15 cm) in width, stiffened to prevent flexibility and warping. The float shall be operated from foot bridges spanning but not touching the concrete or from the edge of the pavement. Floating shall pass gradually from one side of the pavement to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or laitance in excess of 1/8 in (3 mm) thick shall be removed and wasted.

(2) Mechanical method. The Contractor may use a machine composed of a cutting and smoothing floats, suspended from and guided by a rigid frame and constantly in contact with, the side forms or underlying surface. If necessary, long-handled floats having blades not less than 5 feet (1.5 m) in length and 6 in (15 cm) in width may be used to smooth and fill in open-textured areas in the pavement. When the crown of the pavement will not permit the use of the mechanical float, the surface shall be floated transversely by means of a long-handled float. Care shall be taken not to work the crown out of the pavement during the operation. After floating, any excess water and laitance in excess of 1/8 in (3 mm) thick shall be removed and wasted. Successive drags shall be lapped one-half the length of the blade.

f. Straight-edge Testing and Surface Correction. After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a Contractor furnished 16 ft (5 m) straightedge swung from handles 3 feet (1 m) longer than one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8 in (3 mm) thick shall be removed from the surface of the pavement and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the smoothness requirements of paragraph 501-5.2e(3). Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

501-4.12 SURFACE TEXTURE. The surface of the pavement shall be finished with either a brush or broom, burlap drag, or artificial turf finish for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. Any imperfections resulting from the texturing operation shall be corrected to the satisfaction of the Engineer.

a. Brush or Broom Finish. If the pavement surface texture is to be a type of brush or broom finish, it shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface, providing corrugations that are uniform in appearance and approximately 1/16 of 1 in (2 mm) in depth.

b. Burlap Drag Finish. If a burlap drag is used to texture the pavement surface, it shall be at least 15 ounces per square yard (555 grams per square meter). To obtain a textured surface, the transverse threads of the burlap shall be removed approximately 1 ft (0.3 m) from the trailing edge. A heavy buildup of grout on the burlap threads produces the desired wide sweeping longitudinal striations on the pavement surface. The corrugations shall be uniform in appearance and approximately 1/16 in (2 mm) in depth.

c. Artificial Turf Finish. If artificial turf is used to texture the surface, it shall be applied by dragging the surface of the pavement in the direction of concrete placement with an approved full-width drag made with artificial turf. The leading transverse edge of the artificial turf drag will be securely fastened to a lightweight pole on a traveling bridge. At least 2 feet of the artificial turf shall be in contact with the concrete surface during dragging operations. A variety of different types of artificial turf are available and approval of any one type will be done only after it has been demonstrated by the Contractor to provide a satisfactory texture. One type that has provided satisfactory texture consists of 7,200 approximately 0.85 inch-long polyethylene turf blades per square foot. The corrugations shall be uniform in appearance and approximately 1/16 in (2 mm) in depth.

SKID-RESISTANT SURFACES SAW-CUT GROOVING. If shown on the plans, skid resistant surfaces for asphalt pavements shall be provided by construction of saw-cut grooves. Saw-cut grooves must meet the requirements of Item P-621.

501-4.14 CURING. Immediately after finishing operations are completed and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured for a 7-day cure period in accordance with one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour during the curing period.

When a two-sawcut method is used to construct the contraction joint, the curing compound shall be applied to the sawcut immediately after the initial cut has been made. The sealant reservoir shall not be sawed until after the curing period has been completed. When the one cut method is used to construct the contraction joint, the joint shall be cured with wet rope, wet rags, or wet blankets. The rags, ropes, or blankets shall be kept moist for the duration of the curing period.

a. Impervious Membrane Method. The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of 1 gallon (4 liters) to not more than 150 sq ft (14 sq m). The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. When hand spraying is approved by the Engineer, a double application rate shall be used to insure coverage. The curing compound shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause, including sawing operations, within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.

(1) Curing in Cold Weather. The concrete shall be maintained at a temperature of at least 50 °F (10 °C) for a period of 72 hours after placing and at a temperature above freezing for the remainder of the curing time. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete injured by frost action shall be removed and replaced at the Contractor's expense.

501-4.15 REMOVING FORMS. Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing. After the forms have been removed, the sides of the slab shall be cured as outlined in one of the methods indicated in paragraph 501-4.14. Major honeycombed areas shall be considered as defective work and shall be removed and replaced in accordance with paragraph 501-5.2(f).

501-4.16 SEALING JOINTS. The joints in the pavement shall be sealed in accordance with Item P-604.

501-4.17 PROTECTION OF PAVEMENT. The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Owner, Engineer, Testing Laboratory, Contractor's employees and agents. This shall include watchmen to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense. The Contractor shall have available at all times, materials for the protection of the edges and surface of the unhardened concrete. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils (0.1 mm) thick of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

Prior to each shift of paving (day shift and night shift), the Contractor shall submit a detailed written plan for protection of the pavement. As a minimum the plan shall address the Contractor's method of barricading and protecting the pavement panels (slabs) from construction traffic and vehicular traffic until opened to traffic in accordance with Paragraph 501-4.18.

501-4.18 OPENING TO TRAFFIC. The pavement shall not be opened to traffic until test specimens molded and cured in accordance with ASTM C 31 have attained a flexural strength of 550 lb / sq in (3,792 kPa) when tested in accordance with ASTM C 78. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Prior to opening the pavement to construction traffic, all joints shall either be sealed or protected from damage to the joint edge and intrusion of foreign materials into the joint. As a minimum, backer rod or tape may be used to protect the joints from foreign matter intrusion. The pavement shall be cleaned before opening for normal operations.

501-4.19 REPAIR, REMOVAL, REPLACEMENT OF SLABS.

a. General. New pavement slabs that are broken or contain cracks shall be removed and replaced or repaired, as specified hereinafter at no cost to the owner. Spalls along joints shall be repaired as specified. Removal of partial slabs is not permitted. Removal and replacement shall be full depth, shall be full width of the slab, and the limit of removal shall be normal to the paving lane and to each original transverse joint. The engineer will determine whether cracks extend full depth of the pavement and may require cores to be drilled on the crack to determine depth of cracking. Such cores shall be 4 in (100 mm) diameter, shall be drilled by the Contractor and shall be filled by the Contractor with a well consolidated concrete mixture bonded to the walls of the hole with epoxy resin, using approved procedures. Drilling of cores and refilling holes shall be at no expense to the owner. All epoxy resin used in this work shall conform to ASTM C 881, Type V.

b. Plastic Shrinkage Cracks. Plastic Shrinkage cracks, which do not exceed 2 inches in depth, shall be cleaned and then pressure injected with epoxy resin, Type IV, Grade 1, using procedures as approved. Care shall be taken to assure that the crack is not widened during epoxy resin injection. All epoxy resin injection shall take place in the presence of the Engineer. Shrinkage cracks, which exceed 2 inches in depth, shall be treated as full depth cracks in accordance with paragraphs 4.19b and 4.19c.

c. Slabs With Cracks through Interior Areas. Interior area is defined as that area more than 6 in (600 mm) from either adjacent original transverse joint. The full slab shall be removed and replaced at no cost to the owner, when there are any full depth cracks, or cracks greater than 4" in depth, that extend into the interior area.

d. Cracks Close To and Parallel To Joints. All cracks essentially parallel to original joints, extending full depth of the slab, and lying wholly within 6 in either side of the joint shall be treated as specified hereinafter. Any crack extending more than 6 in (600 mm) from the joint shall be treated as specified above in subparagraph "Slabs With Cracks Through Interior Area."

(1) Full Depth Cracks Present, Original Joint Not Opened. When the original uncracked joint has not opened, the crack shall be sawed and sealed, and the original joint filled with epoxy resin as specified below. The crack shall be sawed with equipment specially designed to follow random cracks. The reservoir for joint sealant in the crack shall be formed by sawing to a depth of 3/4 in (19 mm), plus or minus 1/16 in (1.6 mm), and to a width of 5/8 in (16 mm), plus or minus 1/8 in (3.2 mm). Any equipment or procedure which causes raveling or spalling along the crack shall be modified or replaced to prevent such raveling or spalling. The joint sealant shall be a liquid sealant as specified. Installation of joint seal shall be as specified for sealing joints or as directed. If the joint sealant reservoir has been sawed out, the reservoir and as much of the lower saw cut as possible shall be filled with epoxy resin, Type IV, Grade 2, thoroughly tooled into the void using approved procedures.

If only the original narrow saw cut has been made, it shall be cleaned and pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. If filler type material has been used to form a weakened plane in the transverse joint, it shall be completely sawed out and the saw cut pressure injected with epoxy resin, Type IV, Grade 1, using approved procedures. Where a parallel crack goes part way across paving lane and then intersects and follows the original joint which is cracked only for the remained of the width, it shall be treated as specified above for a parallel crack, and the cracked original joint shall be prepared and sealed as originally shown on the plans.

(2) Full Depth Cracks Present, Original Joint Also Cracked. At a joint, if there is any place in the lane width where a parallel crack and a cracked portion of the original joint overlap, the entire slab containing the crack shall be removed and replaced for the full lane width and length.

e. Removal and Replacement of Full Slabs. Where it is necessary to remove full slabs, unless there are keys or dowels present, all edges of the slab shall be cut full depth with a concrete saw. All saw cuts shall be perpendicular to the slab surface. If keys, dowels, or tie bars are present along any edges, these edges shall be sawed full depth 24 in (150 mm) from the edge if only keys are present, or just beyond the end of the dowels or tie bars if they are present. These joints shall then be carefully sawed on the joint line to within 1 in (25 mm) of the depth of the dowel or key.

The main slab shall be further divided by sawing full depth, at appropriate locations, and each piece lifted out and removed. Suitable equipment shall be used to provide a truly vertical lift, and approved safe lifting devices used for attachment to the slabs. The narrow strips along keyed or doweled edges shall be carefully broken up and removed using light, hand-held jackhammers, 30 lb (14 kg) or less, or other approved similar equipment.

Care shall be taken to prevent damage to the dowels, tie bars, or keys or to concrete to remain in place. The joint face below keys or dowels shall be suitably trimmed so that there is not abrupt offset in any direction greater than 1/2 in (12 mm) and no gradual offset greater than 1 in (25 mm) when tested in a horizontal direction with a 12 ft (3.6 m) straightedge.

No mechanical impact breakers, other than the above hand-held equipment shall be used for any removal of slabs. If underbreak between 1-1/2 and 4 in (37 and 100 mm) deep occurs at any point along any edge, the area shall be repaired as directed before replacing the removed slab. Procedures directed will be similar to those specified for surface spalls, modified as necessary.

If underbreak over 4 in (100 mm) deep occurs, the entire slab containing the underbreak shall be removed and replaced. Where there are no dowels, tie bars, or keys on an edge, or where they have been damaged, dowels of the size and spacing as specified for other joints in similar pavement shall be installed by epoxy grouting them into holes drilled into the existing concrete using procedures as specified. Original damaged dowels or tie bars shall be cut off flush with the joint face. Protruding portions of dowels shall be painted and lightly oiled. All 4 edges of the new slab shall thus contain dowels or original keys or original tie bars.

Placement of concrete shall be as specified for original construction. Prior to placement of new concrete, the underlying material (unless it is stabilized) shall be re-compacted and shaped as specified in the appropriate SECTION of these specifications. The surfaces of all four joint faces shall be cleaned of all loose material and contaminants and coated with a double application of membrane forming curing compound as bond breaker. Care shall be taken to prevent any curing compound from contacting dowels or tie bars. The resulting joints around the new slab shall be prepared and sealed as specified for original construction.

f. Repairing Spalls Along Joints. Where directed, spalls along joints of new slabs, and along parallel cracks used as replacement joints, shall be repaired by first making a vertical saw cut at least 1 in (25 mm) outside the spalled area and to a depth of at least 2 in (50 mm). Saw cuts shall be straight lines forming rectangular areas. The concrete between the saw cut and the joint, or crack, shall be chipped out to remove all unsound concrete and at least 1/2 in (12 mm) of visually sound concrete. The cavity thus formed shall be thoroughly cleaned with high-pressure water jets supplemented with compressed air to remove all loose material. Immediately before filling the cavity, a prime coat of epoxy resin, Type III, Grade I, shall be applied to the dry cleaned surface of all sides and bottom of the cavity, except any joint face. The prime coat shall be applied in a thin coating and scrubbed into the surface with a stiff-bristle brush. Pooling of epoxy resin shall be avoided. The cavity shall be filled with low slump Portland cement concrete or mortar or with epoxy resin concrete or mortar. Concrete (Delpatch by DS Brown or an approved equal may be permitted) shall be used for larger spalls, generally those more than 1/2 cu. ft. in size, and mortar SHALL BE USED FOR THE SMALLER ONES. ANY SPALL LESS THAN 1 INCH WIDE and less than the depth of the joint seal reservoir should remain and filled with joint sealant. In the case of preformed joint seals, use a polymer patch material as recommended by the joint seal manufacturer. Where the spalled area abuts a joint, an insert or other bond-breaking medium shall be used to prevent bond at the joint face. A reservoir for the joint sealant shall be sawed to the dimensions required for other joints, or as required to be routed for cracks. The reservoir shall be thoroughly cleaned and sealed with the sealer specified for the joints. If any spall penetrates half the depth of the slab or more, the entire slab shall be removed and replaced as previously specified.

g. Repairing Joint Overcuts into Existing Pavements. Where proposed joints do not match existing joints, the Contractor shall not saw-cut into existing pavement more than 2 inches horizontally. This overcut shall be filled with a Engineer approved epoxy material in accordance with the manufacturer's instructions. Where proposed joints match existing joints, the Contractor shall minimize the damage to the existing joint sealing materials. Damaged joint seal material shall be removed and replaced in accordance with section P-605.

501-4.20 EXISTING CONCRETE PAVEMENT REMOVAL AND REPAIR.

All operations shall be carefully controlled to prevent damage to the concrete pavement and to the underlying material to remain in place. All saw cuts shall be made perpendicular to the slab surface.

a. Removal of Existing Pavement Slab. When it is necessary to remove existing concrete pavement and leave adjacent concrete in place, unless there are dowels or keys present, the joint between the removal area and adjoining pavement to stay in place, including dowels, tie bars or keys, shall first be cut full depth with a standard diamond-type concrete saw. If keys or dowels are present at this joint, the saw cut shall be made full depth 6 in (150 mm) from the joint if only keys are present, or just beyond the end of dowels if dowels are present. The edge shall then be carefully sawed on the joint line to within 1 in (25 mm) of the top of the dowel or key. Next, a full depth saw cut shall be made parallel to the joint at least 24 in (600 mm) from the joint and at least 12 in (300 mm) from the end of any dowels. All pavement between this last saw cut and the joint line shall be carefully broken up and removed using hand-held jackhammers, 30 lb. (14 kg) or less, or the approved light-duty equipment which will not cause stress to propagate across the joint saw cut and cause distress in the pavement which is to remain in place. Where dowels or keys are present, care shall be taken to produce an even, vertical joint face below the dowels or keys. If the Contractor is unable to produce such a joint face, or if underbreak or other distress occurs, the Contractor shall saw the dowels or keys flush with the joint. The Contractor shall then install new dowels, of the size and spacing used for other similar joints, by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph "Placing dowels and Tie-bars. All this shall be at no additional cost to the Owner. Dowels of the size and spacing indicated shall be installed as shown on the drawings by epoxy resin bonding them in holes drilled in the joint face as specified in paragraph "Placing Dowels and Tie Bars". The joint face shall be sawed or otherwise trimmed so that there is no abrupt offset in any direction greater than 1/2 in (12 mm) and no gradual offset greater than 1 in (25 mm) when tested in a horizontal direction with a 12 ft. (3.6 m) straightedge.

b. Edge Repair. The edge of existing concrete pavement against which new pavement abuts shall be protected from damage at all times. Areas that are damaged during construction shall be repaired at no cost to the Owner; repair of previously existing damage areas **will be considered a subsidiary part of concrete pavement construction**.

(1) Spall Repair. Spalls shall be repaired where indicated and where directed. Repair materials and procedures shall be as previously specified in subparagraph "Repairing Spalls Along Joints."

(2) Underbreak Repair. All underbreak shall be repaired. First, all delaminated and loose material shall be carefully removed. Next, the underlying material shall be recompacted, without addition of any new material. Finally, the void shall be completely filled with paving concrete, thoroughly consolidated. Care shall be taken to produce an even joint face from top to bottom. Prior to placing concrete, the underlying material shall be thoroughly moistened. After placement, the exposed surface shall be heavily coated with curing compound.

(3) Underlying Material. The underlying material adjacent to the edge of an under the existing pavement which is to remain in place shall be protected from damage or disturbance during removal operations and until placement of new concrete, and shall be shaped as shown on the drawings or as directed. Sufficient material shall be kept in place outside the joint line to prevent disturbance (or sloughing) of material under the pavement that is to remain in place. Any material under the portion of the concrete pavement to remain in place, which is disturbed or loses its compaction shall be carefully removed and replaced with concrete as specified in paragraph "Underbreak Repair." The underlying material outside the joint line shall be thoroughly compacted and moist when new concrete is placed.

501-4.21 PROPOSED PAVING PLAN AND CONFERENCE

a. Paving Plan. At least 45 days before the start of paving, the Contractor shall submit a detailed Paving Plan to the Engineer. The paving plan shall include, all elements associated with subbase preparation, transporting, placing, finishing, curing, texturing, joint formation, dowel placement, sealing, and repairing defective work. The Paving Plan shall be consistent with the Innovative Pavement Research Program (IPRF) Report IPRF-01-002-1, *"Best Practices for Airport Concrete Pavement Construction (Rigid Airport Pavement)"*.

b. Pre-Paving Conference. At least 7 days before and not more than 30 days before concrete placement, the Contractor shall hold a pre-paving conference with the Engineer, airport personnel and quality control and assurance test lab(s) to review project specific requirements related to the concrete paving and related project-planning activities. The following items shall be reviewed:

1. Submittals and status of submittals.
2. Critical material supply/availability issues.
3. Concrete plant and aggregate stockpile management.
4. Concrete paving requirements.
5. Paving schedule.
6. Weather management plan.
7. Test section requirements.
8. Contractor quality control testing.
9. Acceptance testing requirements.
10. Stop work authority; and under what criteria shall a stop work order be issued.
11. Issues and disputes resolution hierarchy.

501-4.22 PAVEMENT CONSTRUCTION TEST SECTION

A test section shall be constructed the first day of paving. The Contractor shall demonstrate that the concrete can be placed within the specified conditions. The Contractor is expected to adjust the mixture, adjust equipment, and modify procedures such that by the end of the test strip the best possible product is attained. That part of the test section which does not meet the minimum requirements of these specifications shall be removed and replaced at no cost to the Owner.

The Contractor shall demonstrate mixing, transporting, placing, finishing, application of curing methods, protection, construction of joints, and performance of the quality control functions specified. Any adjustments of the mixture, placing, or finishing procedures to meet the field conditions will be coordinated with the owner's representative prior to implementation by the Contractor. The Contractor shall obtain written approval of the test section, from the owner's representative prior to proceeding with the work. The test section approval/rejection will be issued by the owner's representative at the end of the day on which the test section is placed.

The test section width shall be the predominant width of the production paving area and the thickness shall be the predominant section thickness. The test section length shall be 400 continuous feet minimum and 1 lot maximum for slipform paving and 100 cubic yards minimum, 1 lot maximum for non-slipform paving.

MATERIAL ACCEPTANCE

501-5.1 ACCEPTANCE SAMPLING AND TESTING. All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section, with the exception of coring for thickness determination, will be performed by the Engineer at no cost to the Contractor. The Contractor shall bear the cost of providing curing facilities for the strength specimens, per paragraph 501-5.1a(3), and coring and filling operations, per paragraph 501-5.1b(1).

Testing organizations performing these tests shall meet the requirements of ASTM C 1077. The laboratory accreditation must be current and listed on the accrediting authority's website. All test methods required for acceptance sampling and testing must be listed on the lab accreditation. A copy of the laboratory's current accreditation and accredited test methods shall be submitted to the Engineer prior to start of construction.

Concrete shall be accepted for strength and thickness on a lot basis.

A lot shall consist of: **a day's production not to exceed 4,000 square yards.**

a. Flexural Strength.

(1) Sampling. Each lot shall be divided into four equal sublots. One sample shall be taken for each sublot from the plastic concrete delivered to the job site. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D 3665. The concrete shall be sampled in accordance with ASTM C 172.

(2) Testing. Two (2) specimens shall be made from each sample. Specimens shall be made in accordance with ASTM C 31 and the flexural strength of each specimen shall be determined in accordance with ASTM C 78. The flexural strength for each sublot shall be computed by averaging the results of the two test specimens representing that sublot.

Immediately prior to testing for flexural strength, the beam shall be weighed and measured for determination of a sample unit weight. Measurements shall be made for each dimension; height, depth, and length, at the mid-point of the specimen and reported to the nearest $1/10^{th}$ in. The weight of the specimen shall be reported to the nearest 0.1 pound. The sample unit weight shall be calculated by dividing the sample weight by the calculated volume of the sample. This information shall be reported as companion information to the measured flexural strength for each specimen.

The samples will be transported while in the molds. The curing, except for the initial cure period, will be accomplished using the immersion in saturated lime water method. The Contractor shall be responsible for initial and final curing and for transporting the specimens to the Engineer's laboratory for flexural strength testing. The specimens shall be delivered to the laboratory 24 hours prior to the required testing time. The Engineer's laboratory shall be responsible for the required minimum 20 hour soak in the calcium hydroxide solution, testing for flexural strength, and reporting of test results. With each specimen delivered to the Engineer's lab, the Contractor shall include a quality control test report that reports at a minimum, the specimen location, time of casting, air content, and temperature.

Slump, air content, and temperature tests will also be conducted by the quality assurance laboratory for each set of strength test samples, per ASTM C 31.

(3) Curing. The Contractor shall provide adequate facilities for the initial curing of beams. During the 24 hours after molding, the temperature immediately adjacent to the specimens must be maintained in the range of 60 °to 80 °F (16 °to 27 °C), and loss of moisture from the specimens must be prevented. The specimens may be stored in tightly constructed wooden boxes, damp sand pits, temporary buildings at construction sites, under wet burlap in favorable weather, or in heavyweight closed plastic bags, or using other suitable methods, provided the temperature and moisture loss requirements are met.

(4) Acceptance. Acceptance of pavement for flexural strength will be determined by the Engineer in accordance with paragraph 501-5.2b.

b. Pavement Thickness.

(1) Sampling. Each lot shall be divided into four equal sublots and one core shall be taken by the Contractor for each sublot. Sampling locations shall be determined by the Engineer in accordance with random sampling procedures contained in ASTM D 3665. Areas, such as thickened edges, with planned variable thickness, shall be excluded from sample locations.

Cores shall be neatly cut with a core drill. The Contractor shall furnish, at his expense, all tools, labor, and materials for cutting samples and filling the cored hole. Core holes shall be filled by the Contractor with a non-shrink grout approved by the Engineer within one day after sampling.

(2) Testing. The thickness of the cores shall be determined by the Engineer by the average caliper measurement in accordance with ASTM C 174.

(3) Acceptance. Acceptance of pavement for thickness shall be determined by the Engineer in accordance with paragraph 501-5.2c.

c. Partial Lots. When operational conditions cause a lot to be terminated before the specified number of tests have been made for the lot, or when the Contractor and Engineer agree in writing to allow overages or minor placements to be considered as partial lots, the following procedure will be used to adjust the lot size and the number of tests for the lot.

Where three sublots have been produced, they shall constitute a lot. Where one or two sublots have been produced, they shall be incorporated into the next lot or the previous lot and the total number of sublots shall be used in the acceptance criteria calculation, that is, n=5 or n=6.

d. Outliers. All individual flexural strength tests within a lot shall be checked for an outlier (test criterion) in accordance with ASTM E 178, at a significance level of 5 percent. Outliers shall be discarded, and the PWL shall be determined using the remaining test values.

e. Patching Cores. Patching of core holes required for testing will be at the Contractor's expense. Patch material shall be a non-shrink grout approved by the Engineer.

501-5.2 ACCEPTANCE CRITERIA.

a. General. Acceptance will be based on the following characteristics of the completed pavement:
(1) Flexural strength
(2) Thickness
(3) Smoothness
(4) Grade
(5) Edge slump

(6) Dowel bar alignment

Flexural strength and thickness shall be evaluated for acceptance on a lot basis using the method of estimating percentage of material within specification limits (PWL). Acceptance using PWL considers the variability (standard deviation) of the material and the testing procedures, as well as the average (mean) value of the test results to calculate the percentage of material that is above the lower specification tolerance limit (L).

Acceptance for flexural strength will be based on the criteria contained in accordance with paragraph 501-5.2e(1). Acceptance for thickness will be based on the criteria contained in paragraph 501-5.2e(2). Acceptance for smoothness will be based on the criteria contained in paragraph 501-5.2e(3). Acceptance for grade will be based on the criteria contained in paragraph 501-5.2e(4).

The Engineer may at any time, not withstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

b. Flexural Strength. Acceptance of each lot of in-place pavement for flexural strength shall be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.

c. Pavement Thickness. Acceptance of each lot of in-place pavement shall be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.

d. Percentage of Material Within Limits (PWL). The percentage of material within limits (PWL) shall be determined in accordance with procedures specified in Section 110 of the General Provisions.

The lower specification tolerance limit (L) for flexural strength and thickness shall be:

Lower Specification Tolerance Limit (L)

Flexural Strength	0.93 × strength specified in paragraph 501-3.1
Thickness	Lot Plan Thickness in inches,- 0.50 in

e. Acceptance Criteria.

(1) Flexural Strength. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. Acceptance and payment for the lot shall be determined in accordance with paragraph 501-8.1.

(2) Thickness. If the PWL of the lot equals or exceeds 90 percent, the lot shall be acceptable. Acceptance and payment for the lot shall be determined in accordance with paragraph 501-8.1.

(3) Smoothness. As soon as the concrete has hardened sufficiently, the pavement surface shall be tested in the transverse direction with a 16 ft straightedge or other specified device. Surface smoothness deviations shall not exceed 1/4 in from a 16 ft straightedge at any location, including placement along and spanning any pavement joint or edge.

Areas in the slab showing high spots of more than 1/4 in but not exceeding 1/2 in in 16 feet shall be marked and immediately ground down with an approved grinding machine to an elevation that falls within the tolerance of 1/4 in or less. Where the departure from the correct cross section exceeds 1/2 in, the pavement shall be removed and replaced at the expense of the Contractor when so directed by the Engineer.

In addition to the 16 ft straight edge, the Contractor shall furnish a 25' wheel base California type profilograph and competent operator to be used to measure longitudinal pavement surface deviations. The profilograph shall be operated under the supervision of the Engineer and in accordance with the manufacturer's instructions. The profilograph shall be operated at a speed no greater than a normal walk. Original profilograms for the appropriate locations interpreted in accordance with ASTM E 1274 shall be furnished to the Engineer. The profilograms shall be recorded on a scale of 1 in equal to 25 feet longitudinally and 1 in equal to 1 in or full scale vertically. Records shall be maintained showing all smoothness measurements.

a. The surface of Runway and Taxiway pavements of continuous placement of 50 feet or more shall be tested and evaluated as described herein. Two passes shall be made in each paving lane greater than 20 feet in width; each pass shall be six feet from and parallel with the centerline of the paving lane. The average of the two passes shall be considered as the profilograph result for the paving lane. For paving lanes less than 20 feet in width, one pass along the centerline shall be required. Tests shall be run the next working day following concrete placement. Each trace shall be completely labeled to show paving lane, wheel pass, and stationing.

b. The Contractor shall furnish paving equipment and employ methods that produce a riding surface for each section of pavement having an average profile index meeting the requirements of paragraph 8.1c. A typical subsection will be considered to be the width of the paving lane and 1/10 mile long. The profile index will be determined in accordance with ASTM E 1274 using a 0.2 in blanking band. Within each 1/10th mile subsection, all areas represented by high points having a deviation in excess of 0.4 in in 25 feet or less shall be removed by the contractor using an approved grinding device or a device consisting of multiple diamond blades. The use of a bush hammer or other impact devices will not be permitted. After removing all individual deviations in excess of 0.4 in, additional corrective work shall be performed if necessary to achieve the required ride quality. All corrective work shall be completed prior to determination of pavement thickness.

c. On those pavement subsections where corrections were necessary, second profilograph runs will be performed to verify that the corrections have produced an average profile index of **15** in per mile or less. If the initial average profile index was less than **15**, only those areas representing greater than 0.4 in deviation will be re-profiled for correction verification.

d. When the average profile index does not exceed **seven (7)** inches per mile, payment will be made for that section at the contract unit price for the completed pavement. When the average profile index exceeds **seven (7)** inches per mile, but does not exceed **15** in per mile, the Contractor may elect to accept a contract unit price adjustment in lieu of reducing the profile index.

e. Individual sections shorter than 50 feet and the last 15 feet of any section where the contractor is not responsible for the adjoining section, shall be straightedged in accordance with Section 501.5.2.e.(3).

f. If there is a section of 250 feet or less, the profilogram for that section shall be included in the evaluation of the previous section. If there is an independently placed section of 50 to 250 feet in length, a profilogram shall be made for that section and the pay adjustment factors for short sections of paragraph 8.1c shall apply.

g. Any corrective work required shall be performed prior to joint sealing and grooving operations.

h. All cost necessary to provide the profilograph and related to furnishing the appropriate profilograms as required in this provision are incidental to concrete pavement construction and no direct compensation will be made therefore.

(4) Grade. An evaluation of the surface grade shall be made by the Engineer for compliance to the tolerances contained below. Records shall be maintained showing all grade measurements. The finished surface shall be surveyed and measured by the Contractor on the same grid as the pavement elevation plans including the centerline and edge of concrete pavement. Grades found to be out of tolerance within a localized area that is holding water, affecting drainage, impacting smoothness or creating transition problems through a known grade break shall be removed and replaced at the Contractor's expense.

Lateral Deviation. Lateral deviation from established alignment of the pavement edge shall not exceed plus or minus 0.10 ft (30 mm) in any lane.

Vertical Deviation. Vertical deviation from established grade shall not exceed plus or minus 0.04 ft (12 mm) at any point.

(5) Edge Slump. When slip-form paving is used, not more than 15 percent of the total free edge of each 500 ft (150 m) segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4 in (6 mm), and none of the free edge of the pavement shall have an edge slump exceeding 3/8 in (10 mm). (The total free edge of 500 feet (150 m) of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; that is, 500 feet (150 m) of paving lane originally constructed as a separate lane will have 1,000 feet (300 m) of free edge, 500 feet (150 m) of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 in (457 mm) from the edge. When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor when so directed by the Engineer.

(6) Dowel Bar Alignment. Dowel bars and assemblies shall be checked for position and alignment. The maximum permissible tolerance on dowel bar alignment in each plane, horizontal and vertical, shall not exceed 2 percent or 1/4 in per ft (20 mm per meter) of a dowel bar. Vertical alignment of dowels shall be measured parallel to the designed top surface of the pavement, except for those across the crown or other grade change joints. Dowels across crowns and other joints at grade changes, shall be measured to a level surface. Horizontal alignment shall be checked perpendicular to the joint edge.

f. Removal and Replacement of Concrete. Any area or section of concrete that is removed and replaced shall be removed and replaced back to planned joints. The Contractor shall replace damaged dowels and the requirements for doweled longitudinal construction joints in paragraph 501-4.10 shall apply to all contraction joints exposed by concrete removal. Removal and replacement shall be in accordance with paragraph 501-4.19 of this specification.

CONTRACTOR QUALITY CONTROL

501-6.1 QUALITY CONTROL PROGRAM. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the General Provisions. The program shall address all elements that affect the quality of the pavement including but not limited to:

a. Mix Design
b. Aggregate Gradation
c. Quality of Materials
d. Stockpile Management
e. Proportioning
f. Mixing and Transportation
g. Placing and Consolidation
h. Joints
i. Dowel Placement and Alignment
j. Flexural or Compressive Strength
k. Finishing and Curing
l. Surface Smoothness

501-6.2 QUALITY CONTROL TESTING. The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content.

A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

a. Fine Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily in accordance with ASTM C 136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture Content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C 70 or ASTM C 566.

b. Coarse Aggregate.

(1) Gradation. A sieve analysis shall be made at least twice daily for each size of aggregate. Tests shall be made in accordance with ASTM C 136 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

(2) Moisture Content. If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made in accordance with ASTM C 566.

c. Slump. Four slump tests shall be performed for each lot of material produced in accordance with the lot size defined in Section 501-5.1. One test shall be made for each sublot. Slump tests shall be performed in accordance with ASTM C 143 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken in accordance with ASTM C 172.

d. Air Content. Four air content tests, shall be performed for each lot of material produced in accordance with the lot size defined in Section 501-5.1. One test shall be made for each sublot. Air content tests shall be performed in accordance with ASTM C 231 for gravel and stone coarse aggregate and ASTM C 173 for slag or other porous coarse aggregate, from material randomly sampled from trucks at the paving site. Material samples shall be taken in accordance with ASTM C 172.

e. Unit Weight and Yield Tests. Four unit weight and yield tests shall be made in accordance with ASTM C 138. The samples shall be taken in accordance with ASTM C 172 and at the same time as the air content tests.

f. Aggregate Quality. The following ASTM C 33 aggregate quality tests shall be performed at the start of paving and every seven paving days:

1. Deleterious substances in accordance with the reduced values of ASTM C 33, Table 3, Class 4S for the portion of the combined aggregate retained on the No. 4 sieve.
2. Flat and elongated pieces for aggregate retained on the No. 4 sieve.

The aggregate quality tests shall be performed on two representative samples obtained from each aggregate stockpile at the plant site. When the specified requirements of the above tests are not met for the first set of two tests, the set of two tests shall be repeated on two other samples. When the specified requirements of the tests are not met for the two consecutive sets of tests, the plant operation shall be stopped and concrete production shall not be restarted until the affected aggregates have been replaced with conforming aggregates.

g. Concrete Temperature. One concrete temperature test shall be performed for each sublot of material. Concrete temperature tests shall be performed in accordance with ASTM C 1064 from material randomly sampled from trucks at the paving site.

The acceptance criteria for concrete temperature specified in 501-4.7 shall be met. When the criteria are not met for the first test, the test shall be repeated on that load. When the second test fails, that load shall be rejected and testing conducted on all consecutive truckloads. When three of any five consecutive truckloads do not fail the test, the testing for concrete temperature shall be continued on the basis of one test per sublot. When three of any five consecutive truckloads fail, the plant operation shall be stopped. Paving may resume after the temperature can be maintained within tolerance.

h. Dowel Bar Alignment. Dowel bars and assemblies shall be checked for position and alignment. The maximum permissible tolerance on dowel bar skew (tilt) in each plane, horizontal and vertical, shall not exceed 1/4 inch per foot of dowel bar. Dowels shall be placed within 1 inch of slab mid-depth and spaced within 1 inch of planned location along the joint. For longitudinal construction joints, the dowel bars shall be embedded one-half the dowel length plus or minus 1 inch. For transverse contraction joints, the dowel center point shall be located within 1 inch of the joint sawcut.

If the dowel alignment cannot be maintained as specified, concrete placement shall be stopped and not be restarted until corrective measures are implemented to ensure that the dowel placement conforms to the specification requirements.

Slab panels with joints exhibiting misaligned dowel bars shall be considered defective and shall be mitigated or replaced, as directed by the Engineer.

i. Hand Finishing at Edges. Hand finishing of the edges and corners of the concrete surface behind the paving equipment shall be limited to 25 percent of the edge per slab panel. Hand finishing of the edges and corners in excess of 25 percent of the edge per slab indicates that the process is not in reasonable conformance and the Contractor shall make the necessary adjustments in the concrete proportions and construction process.

Use of cutting straightedges on the slab surface is not considered hand finishing.

Addition of water to the surface of the concrete pavement behind the paving equipment is not allowed.

501-6.3 CONTROL CHARTS. The Contractor shall maintain linear control charts for fine and coarse aggregate gradation, slump, and air content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept up to date at all times. 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, or Specification 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 potential problem and the Contractor is not taking satisfactory corrective action, the Engineer may halt production or acceptance of the material.

a. Combined Aggregate Gradation. The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. The 0.45 Power Curve, shall be developed showing the percent of aggregate passing each sieve size (vertical axis) versus the sieve size raised to the 0.45 power (horizontal axis). The chart shall include boundaries for the maximum density line for the maximum aggregate size plus and minus on sieve size. The maximum size minus one sieve size boundary shall be designated as the upper boundary and maximum aggregate size plus one sieve size boundary shall be designated as the lower boundary.

The combined aggregate grading for each mixture shall be plotted on the 0.45 Power Chart. The combined aggregate gradation plotted on the 0.45 Power Chart shall not cross the upper boundary of the 0.45 Power Chart for the ½ inch sieve size and smaller; nor, shall the combined aggregate gradation plotted on the 0.45 Power Chart cross the lower boundary of the 0.45 Power Chart between the ½ inch sieve size and the #30 sieve size.

b. Slump and Air Content. The Contractor shall maintain linear control charts both for individual measurements and range (that is, difference between highest and lowest measurements) for slump and air content in accordance with the following Action and Suspension Limits.

Control Chart Limits

Control Parameter	Individual Measurements		Range Suspension Limit
	Action Limit	Suspension Limit	
Slip Form:			
Slump	+0 to -1 in (0-25 mm)	+0.5 to -1.5 in (13-38 mm)	+/- 1.5 in (38 mm)
Air Content	+/- 1.2%	+/- 1.8%	+/- 2.5%
Fixed Form:			
Slump	+ 0.5 to -1 in (13-25 mm)	+1 to -1.5 in (25-38 mm)	+/- 1.5 in (38 mm)
Air Content	+/- 1.2%	+/- 1.8%	+/- 2.5%

The individual measurement control charts shall use the mix design target values as indicators of central tendency.

501-6.4 CORRECTIVE ACTION. The Contractor Quality Control Program shall indicate that appropriate action shall be taken when the process is believed to be out of control. The Contractor Quality Control Program shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

a. Combined Aggregate Gradation. A movement of the point vertically on the Coarseness and Workability Chart (Figure 1) is acceptable provided that the movement does not exceed 3 units on the workability scale. The horizontal movement shall not vary by more than 5 units on the coarseness factor scale. When the variance exceeds the given tolerance, the grading shall be determined to be out of control. When proportioning can remedy the problem, adjustments to weights shall be made. When proportioning adjustments will not correct the problem, new aggregate stockpiles shall be used.

b. Fine and Coarse Aggregate Moisture Content. Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5 percent, the scale settings for the aggregate batcher and water batcher shall be adjusted.

c. Slump. The Contractor shall halt production and make appropriate adjustments whenever:

(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.

d. Air Content. The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:

(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.

Whenever a point falls outside the Action Limits line, the air-entraining admixture dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility.

METHOD OF MEASUREMENT

501-7.1 Portland cement concrete pavement shall be measured by the number of **square yards** of reinforced pavement as specified in-place, completed and accepted. Saw-cut grooving shall be measured by the number of square yards of saw-cut grooving as specified in-place, completed and accepted.

BASIS OF PAYMENT

501-8.1 PAYMENT. Payment for concrete pavement meeting all acceptance criteria as specified in paragraph 501-5.2 Acceptance Criteria shall be based on results of smoothness, strength and thickness tests. Payment for acceptable lots of concrete pavement shall be adjusted in accordance with paragraph 501-8.1a for strength and thickness and 501-8.1c for smoothness, subject to the limitation that:

The total project payment for concrete pavement shall not exceed **100** percent of the product of the contract unit price and the total number of **square yards** of concrete pavement used in the accepted work (See Note 2 under Table 3).

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings.

a. Basis of Adjusted Payment. The pay factor for each individual lot shall be calculated in accordance with Table 3. A pay factor shall be calculated for both flexural strength and thickness. The lot pay factor shall be the higher of the two values when calculations for both flexural strength and thickness are 100 percent or higher. The lot pay factor shall be the product of the two values when only one of the calculations for either flexural strength or thickness is 100 percent or higher. The lot pay factor shall be the lower of the two values when calculations for both flexural strength and thickness are less than 100 percent.

Table 3. Price Adjustment Schedule[1]

Percentage of Materials Within Specification Limits (PWL)	Lot Pay Factor (Percent of Contract Unit Price)
96 – 100	106
90 – 95	PWL + 10
75 – 90	0.5 PWL + 55
55 – 74	1.4 PWL – 12
Below 55	Reject[2]

[1] Although it is theoretically possible to achieve a pay factor of 106 percent for each lot, actual payment in excess of 100 percent shall be subject to the total project payment limitation specified in paragraph 501-8.1.
[2] The lot shall be removed and replaced. However, the engineer may decide to allow the rejected lot to remain. In that case, if the engineer and contractor agree in writing that the lot shall not be removed, it shall be paid for at 50 percent of the contract unit price and the total project payment limitation shall be reduced by the amount withheld for the rejected lot.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price. Payment shall be subject to the total project payment limitation specified in paragraph 501-8.1. Payment in excess of 100 percent for accepted lots of concrete pavement shall be used to offset payment for accepted lots of concrete pavement that achieve a lot pay factor less than 100 percent.

b. Payment. Payment shall be made under:

Item P-501-8.1a Portland Cement Concrete Pavement (16”) – per square yard

c. Basis of adjusted payment for Smoothness. Price adjustment for pavement smoothness will apply to the total area of concrete within a section of pavement and shall be applied in accordance the following equation and schedule:

(Sq yd in section) x (original unit price per sq yd) x PFm =
reduction in payment for area within section

Average Profile Index (Inches Per Mile) Pavement Strength Rating			Contract Unit Price Adjustment (PFm)
Over 30,000 lb		Short Sections	
0 - 7		0 - 15	0.00
7.1 - 9		15.1 - 16	0.02
9.1 - 11		16.1 - 17	0.04
11.1 - 13		17.1 - 18	0.06
13.1 - 14		18.1 - 20	0.08
14.1 - 15		20.1 - 22	0.10
15.1 and up		22.1 and up	Corrective work required

TESTING REQUIREMENTS

ASTM C 31	Making and Curing Concrete Test Specimens in the Field
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 70	Surface Moisture in Fine Aggregate
ASTM C 78	Test for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 88	Test for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 131	Test for Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 138	Test for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143	Test for Slump of Hydraulic Cement Concrete
ASTM C 172	Sampling Freshly Mixed Concrete
ASTM C 173	Test for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C 174	Measuring Thickness of Concrete Elements Using Drilled Concrete Cores
ASTM C 227	Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method)
ASTM C 231	Test for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 289	Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
ASTM C 295	Petrographic Examination of Aggregates for Concrete
ASTM C 114	Chemical Analysis of Hydraulic Cement
ASTM C 535	Test for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 566	Total Evaporable Moisture Content of Aggregates by Drying
ASTM C 642	Test for Density, Absorption, and Voids in Hardened Concrete
ASTM C 666	Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction And Criteria for Laboratory Evaluation
ASTM C 1260	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C 1567	Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Cementitious Materials and Aggregates (Accelerated Mortar-Bar Method
ASTM D 3665	Random Sampling of Paving Materials

ASTM D 4791	Test Method for Flat or Elongated Particles in Coarse Aggregate
ASTM E 178	Dealing With Outlying Observations
ASTM E 1274	Test for Measuring Pavement Roughness Using a Profilograph
AASHTO T 26	Quality of Water to be Used in Concrete

MATERIAL REQUIREMENTS

ASTM A 184	Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A 185	Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497	Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 704	Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A 714	Specification for High-Strength Low-Alloy Welded and Seamless Steel Pipe
ASTM A 996	Specification for Rail-Steel and Axle Steel Deformed Bars for Concrete Reinforcement
ASTM C 33	Specification for Concrete Aggregates
ASTM C 94	Specification for Ready-Mixed Concrete
ASTM C 150	Specification for Portland Cement
ASTM C 171	Specification for Sheet Materials for Curing Concrete
ASTM C 260	Specification for Air-Entraining Admixtures for Concrete
ASTM C 309	Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Specification for Chemical Admixtures for Concrete
ASTM C 595	Specification for Blended Hydraulic Cements
ASTM C 618	Specification for Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM C 881	Specification for Epoxy-Resin Base Bonding System for Concrete
ASTM C 989	Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
ASTM D 1751	Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving And Structural Construction
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 309	Guide for Consolidation of Concrete
Department of Defense MIL-DTL-24441/20a	(1999)_Paint, Epoxy-Polyamide, Green Primer, Formula 150, Type III

END ITEM P-501

ITEM P-603 BITUMINOUS TACK COAT

DESCRIPTION

603-1.1 This item shall consist of preparing and treating a bituminous or concrete surface with bituminous material in accordance with these specifications and in reasonably close conformity to the lines shown on the plans.

MATERIALS

603-2.1 BITUMINOUS MATERIALS. The bituminous material shall be either cutback asphalt, emulsified asphalt, or tar and shall conform to the requirements of Table 1. The type, grade, controlling specification, and application temperature of bituminous material to be used shall be specified by the Engineer.

Table 1 Bituminous Material

Type and Grade	Specification	Application Temperature	
		Deg. F	**Deg. C**
Emulsified Asphalt			
SS-1, SS-1h	ASTM D 977	75-130	25-55
CSS-1, CSS-1h	ASTM D 2397	75-130	25-55
Cutback Asphalt			
RC-70	ASTM D 2028	120-160	50-70
Tar			
RTCB 5, RTCB 6	AASHTO M 52	60-120	15-50

CONSTRUCTION METHODS

603-3.1 WEATHER LIMITATIONS. The tack coat shall be applied only when the existing surface is dry and the atmospheric temperature is above 60 °F (15 °C). The temperature requirements may be waived, but only when so directed by the Engineer.

603-3.2 EQUIPMENT. The Contractor shall provide equipment for heating and applying the bituminous material.

The distributor shall be designed, equipped, maintained, and operated so that bituminous material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10 percent. Distributor equipment shall include a tachometer, pressure gauges, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

If the distributor is not equipped with an operable quick shut off valve, the tack operations shall be started and stopped on building paper. The Contractor shall remove blotting sand prior to asphalt concrete lay down operations at no additional expense to the owner.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

603-3.3 APPLICATION OF BITUMINOUS MATERIAL. Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or air blast to remove all loose dirt and other objectionable material.

Emulsified asphalt shall be diluted by the addition of water when directed by the Engineer and shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlying mixture is placed on the tacked surface.

The bituminous material including vehicle or solvent shall be uniformly applied with a bituminous distributor at the rate of **0.05 to 0.15 gallons per square yard** (0.24 to 0.72 liters per square meter) depending on the condition of the existing surface. The type of bituminous material and application rate shall be approved by the Engineer prior to application.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

603-3.4 BITUMINOUS MATERIAL CONTRACTOR'S RESPONSIBILITY. Samples of the bituminous material that the Contractor proposes to use, together with a statement as to its source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the bituminous material to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials so demonstrated by service tests, shall be acceptable.

The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of bituminous material shipped to the project. The tests reports shall contain all the data required by the applicable specification. If the Contractor applies the material prior to receipt of the tests reports, payment for the material shall be withheld until they are received. If the material does not pass the specifications it shall be replaced at the contractor's expense. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing samples of material received for use on the project.

603-3.5 FREIGHT AND WEIGH BILLS. Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the bituminous materials actually used in the construction covered by the contract. The Contractor shall not remove bituminous material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

METHOD OF MEASUREMENT

603-4.1 The bituminous material for tack coat shall be measured by the square yard. Matching vertical edges requiring a tack coat will not be measured for payment, as this work is incidental to asphalt paving.

BASIS OF PAYMENT

603.5-1 Payment shall be made at the contract unit price per **square yard** of bituminous material. This price shall be full compensation for furnishing all materials, for all preparation, delivery, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-603-5.1 Bituminous Tack Coat-per **square yard**

MATERIAL REQUIREMENTS

ASTM D 633	Volume Correction Table for Road Tar
ASTM D 977	Emulsified Asphalt
ASTM D 1250	Petroleum Measurement Tables
ASTM D 2028	Cutback Asphalt (Rapid-Curing Type)
ASTM D 2397	Cationic Emulsified Asphalt
Asphalt Institute Manual MS-6 Table IV-3	Asphalt Pocketbook of Useful Information (Temperature-Volume Corrections for Emulsified Asphalts)

END ITEM P-603

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ITEM P-604 COMPRESSION JOINT SEALS FOR CONCRETE PAVEMENTS

DESCRIPTION

604-1.1 This item shall consist of preformed polychloroprene compression seals used for sealing joints of rigid pavements.

MATERIALS

604-2.1 PREFORMED SEALS. Preformed joint seal materials shall be a vulcanized elastomeric compound using polychloroprene as the only base polymer. The material and the manufactured seal itself shall conform to ASTM D 2628 and CRD C 548. The joint seal shall be a labyrinth type seal with the uncompressed depth of the seal greater than the uncompressed width of the seal, [except that for seals 1 in or greater in width, the depth need be only 1 in or greater]. The actual width of the uncompressed seal shall be 13/16 in or 1 in within a tolerance of plus 1/8 in and minus 1/16 in.

604-2.2 LUBRICANT/ADHESIVE. Lubricant/adhesive used for the preformed elastomeric joint seal shall be a one-component compound conforming to ASTM D 2835.

604-2.3 DELIVERY AND STORAGE. Materials delivered to the job site shall be inspected for defects, unloaded, and stored with a minimum of handling to avoid damage. Storage facilities shall be provided at the job site to protect materials from weather and to maintain them at temperatures as recommended by the manufacturer.

604-2.4 SUBMITTALS. Certified copies of test results shall be provided **20** days prior to use of material on the project.

a. Construction Equipment List. List of proposed equipment to be used in the performance of construction work, including descriptive data shall be provided to the engineer **20** days prior to use on the project.

b. Manufacturer's Instructions. Where installation procedures, or any part thereof, are required to be in accordance with the manufacturer's recommendations, printed copies of these recommendations shall be furnished to the engineer **30** days prior to use on the project. Installation of the material will not be allowed until the recommendations are received. Failure to furnish these recommendations can be a cause for rejection of the material.

c. Samples. Regardless of testing responsibility, samples of the materials shall be submitted by the contractor to the engineer for written approval **30** days prior to use on the project. Written or printed directions from the manufacturer giving recommended criteria for installation shall be furnished to the engineer at the same time, plus certification from the manufacturer that the seal selected is recommend for the installation involved on this project. No material will be allowed to be used until it has been approved.

604-2.5 TEST REQUIREMENTS. Each lot of preformed joint seal and lubricant/adhesive produced for this project shall be sampled, adequately identified, and tested for conformance with the referenced applicable material specification. A lot of preformed seal shall consist of one day's production or 20,000 linear feet for each cross section, whichever is less. A lot of lubricant/adhesive shall consist of one day's production. Samples of the preformed joint seal and lubricant/adhesive material shall be submitted and will be tested by the Engineer. No material shall be used at the project prior to receipt of written notice that the materials meet the laboratory requirements. The cost of testing the samples from each original lot supplied will be borne by the Engineer. If the sample fails to meet specification requirements, the materials represented by the sample shall be replaced and the new materials tested. Testing of the preformed joint and lubricant/adhesive material shall be the responsibility of the Contractor and shall be performed in an approved independent laboratory and certified copies of the test reports shall be submitted for approval **20** days prior to the use of the materials at the job site. Samples of each lot of material shall also be submitted and will be retained by the Engineer for possible future testing should the materials appear defective during or after application. The Contractor shall furnish additional samples of materials, in sufficient quantity to be tested, upon request. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will also be based on the performance of the in-place materials.

604-3.1 EQUIPMENT. Machines, tools, and equipment used in the performance of the work required by this section shall be approved by the engineer before the work is started and shall be maintained by the contractor in satisfactory condition at all times.

a. Joint Cleaning Equipment.

(**1) Concrete Saw.** A self-propelled power saw with water-cooled diamond or abrasive saw blades shall be provided for cutting joints to the depths and widths specified and for removing filler existing old joint seal or other material embedded in the joints or adhered to the joint faces.

(**2) Sandblasting Equipment.** Sandblasting equipment shall include an air compressor, hose, and a long-wearing venturi-type nozzle of proper size, shape, and opening. The maximum nozzle opening should not exceed 1/4 in. The air compressor shall be portable and shall be capable of furnishing not less than 150 cubic feet per minute and maintaining a line pressure of not less than 90 psi at the nozzle while in use. The compressor shall be equipped with traps that will maintain the compressed air free of oil and water. The nozzle shall have an adjustable guide that will hold the nozzle aligned with the joint about 1 in above the pavement surface and will direct the blast to clean the joint walls. The height, angle of inclination, and the size of the nozzle shall be adjusted as necessary to ensure satisfactory results.

(**3) Waterblasting Equipment.** Waterblasting equipment shall include a trailer-mounted water tank, pumps, high-pressure hose, a wand with safety release cutoff controls, nozzle, and auxiliary water resupply equipment. The water tank and auxiliary water resupply equipment shall be sufficient capacity to permit continuous operations. The pumps, hoses, wand, and nozzle shall be of sufficient capacity to permit the cleaning of both walls of the joint and the pavement surface for a width of at least 1/2 in on either side of the joint. The pump shall be capable of supplying a pressure of at least 3,000 psi. A pressure gauge mounted at the pump shall show at all times the pressure in pounds per square inch at which the equipment is operating.

b. Sealing Equipment. Equipment used to install the preformed seal shall place the preformed seal to the prescribed depths within the specified tolerances without cutting, nicking, twisting, or otherwise damaging the seal. The equipment shall not stretch or compress the seal more than 3.0 percent longitudinally during installation. The machine shall be an automatic self-propelled joint seal application equipment and shall be engine powered. The machine shall include a reservoir for the lubricant/adhesive, a device for conveying the lubricant/adhesive in the proper quantities to the sides the preformed seal or the sidewalls of the joint, a reel capable of holding one full spool of preformed seal, and a power-driven apparatus for feeding the joint seal through a compression device and inserting the seal into the joint. The equipment shall also include a guide to maintain the proper course along the joint being sealed. The machine shall at all times be operated by an experienced operator.

CONSTRUCTION METHODS

604-4.1 ENVIRONMENTAL CONDITIONS. The ambient temperature and the pavement temperature within the joint wall shall be at least 35 °F and rising at the time of installation of the materials. Sealant application will not be permitted if moisture or any foreign material is observed in the joint.

604-4.2 TRIAL JOINT SEAL AND LUBRICANT/ADHESIVE INSTALLATION. Prior to the cleaning and sealing of the joints for the entire project, a test section at least 200 feet long shall be prepared at a location directed in the project pavement using the specified materials and the approved equipment, so as to demonstrate the proposed joint preparation and sealing of all types of joints in the project. Following the completion of the trial length and before any other joint is sealed, the trial joints will be inspected by the Engineer to determine that the materials and installation meet the requirements specified. If materials or installation do not meet requirements the materials shall be removed, and the joints shall be recleaned and resealed at no cost to the owner. No other joints shall be sealed until the test installation has been approved. If the trial section is approved, it may be incorporated into the permanent work and paid for at the contract unit prices per linear foot for sealing items scheduled. All other joints shall be sealed in the manner approved for sealing the trial joints.

604-4.3 PREPARATION OF JOINTS. Immediately before installation of the preformed joint seal, the joints shall be thoroughly cleaned to remove all laitance, filler, foreign material and protrusions of hardened concrete from the sides and upper edges of the joint space to be sealed. Any irregularity in the joint face that would prevent uniform contact between the joint seal and the joint face shall be corrected by saw cutting prior to the installation of the joint seal.

a. Sawing. Joints shall be sawed to clean and to open them to the full specified width and depth. Immediately following the sawing operation, the joint faces and opening shall be thoroughly cleaned using a water jet to remove all saw cuttings or debris remaining on the faces or in the joint opening. Compression seal shall be installed within 3 calendar days of the time the individual joint cavity is sawed. Depth of sawing the cavity shall be between 3/4 and 1 in deeper than the uncompressed depth of the seal (or otherwise recommended by the manufacturer). The saw cut for the joint seal cavity shall at all locations be centered over the joint line. The nominal width of the sawed joint seal cavity shall be as follows; the actual width shall be within a tolerance of plus or minus 1/16 in:

(**1)** If a nominal 13/16 in wide compression seal is furnished, the nominal width of the saw cut shall be 8/16 in. However, this shall apply only when the pavement temperature at the time of sawing is between +50 °F and +155 °F . If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1/16 in. If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 in.

(**2)** If a nominal 1 in wide compression seal is furnished, the nominal width of the saw cut shall be 9/16 in. However, this shall apply only when the pavement temperature at the time of sawing is between +55 °F and +180 °F. If the pavement temperature at the time of sawing is above this range, the nominal width of the saw cut shall be decreased 1/16 in. If the pavement temperature at the time of sawing is below this range, the nominal width of the saw cut shall be increased 1/16 in.

The pavement temperature shall be measured and recorded in the presence of the Engineer. Measurement shall be made each day before commencing sawing and at any other time during the day when the temperature appears to be moving out of the allowable sawing range.

b. Sandblast Cleaning. The concrete joint faces and pavement surfaces extending at least 1/2 in from the joint edges shall be sandblasted clean. A multiple pass technique shall be used until the surfaces are free of dust, direct curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water.

c. Waterblast Cleaning. The concrete joint faces and pavement surfaces extending at least 1/2 in from the joint edges shall be waterblasted clean. A multiple pass technique shall be used until the surfaces are free of dust, direct, curing compound, or any residue that might prevent ready insertion or uniform contact of the seal and bonding of the lubricant/adhesive to the concrete. After final cleaning and immediately prior to sealing, the joints shall be blown out with compressed air and left completely free of debris and water.

d. Rate of Progress. The stages of joint preparation which includes sandblasting or waterblasting of the joint faces and air pressure cleaning of the joints shall be limited to only the linear footage of joint that can be sealed during the same workday.

604-4.4 INSTALLATION OF THE PREFORMED SEAL.

a. Time of Installation. Joints shall be sealed within 3 calendar days of sawing the joint seal cavity and immediately following concrete cure and the final cleaning of the joint walls. Open joints ready for sealing that cannot be sealed under the conditions specified herein shall be provided with an approved temporary seal to prevent infiltration of foreign material. When rain interrupts the sealing operations, the joints shall be washed, air pressure cleaned and allowed to dry prior to installing the lubricant/adhesive and preformed seal.

b. Sequence of Installation. Longitudinal joints shall be sealed first, followed by transverse joints and then all other joints. Seals in longitudinal joints shall be cut so that all transverse joint seals will be intact from edge to edge of the pavement. Intersections shall be made monolithic by use of joint seal adhesive and care in fitting the intersection parts together. Extender pieces of seal shall not be used at intersections. Any seal falling short of the intersection shall be removed and replaced with new seal at no additional cost to the owner.

604-4.5 SEALING OF JOINTS. The joint seal shall be installed using the equipment specified in paragraph 604-3.1b EQUIPMENT. The sides of the joint seal or the sides of the joint shall be covered with a coating of lubricant/adhesive and the seal installed in such a manner as to conform to all requirements specified. Butt joints and seal intersections shall be coated with liberal applications of lubricant/adhesive. Lubricant/adhesive spilled on the pavement shall be removed immediately to prevent setting on the pavement. An in-place joint seal shall be in an upright position and free form twisting, distortion, cuts, and stretching or compression in excess of 3.0 percent. The joint seal shall be placed at a uniform depth within the tolerances specified. In-place joint seal that fails to meet the specified requirements shall be removed and replaced with new joint seal in a satisfactory manner at no additional cost to the owner. The preformed joint seal shall be placed to a depth of 3/16 in, plus or minus 1/8 in, below the pavement surface except when the joint is beveled or has a radius at the surface, or unless otherwise directed. For beveled joints or joints with a radius at the surface, the preformed joint seal shall be installed at a depth of 1/8 in, plus or minus 1/8 in, below the bottom of the edge of the bevel or radius. No part of the seal shall be allowed to project above the surface of the pavement or above the edge of the bevel or radius. The seal shall be installed in the longest practicable lengths in longitudinal joints and shall be cut at the joint intersections so as to provide continuous installation of the seal in the transverse joints. The lubricant/adhesive in the longitudinal shall be allowed to set for 1 hour prior to cutting at the joint intersections to reduce the possibility of shrinkage. For all transverse joints, the minimum length of the preformed joint seal shall be the pavement width from edge to edge.

604-4.6 CLEAN-UP. Upon completion of the project, all unused materials shall be removed from the site, all lubricant/adhesive on the pavement surface shall be removed, and the pavement shall be left in clean condition.

604-5.1 QUALITY CONTROL PROVISIONS.

a. Equipment. The application equipment shall be inspected to assure uniform application of lubricant/adhesive to the sides of the preformed joint seal or the walls of the joint. If any equipment causes cutting, twisting, nicking, excessive stretching or compressing of the preformed seal, or improper application of the lubricant/adhesive, the operation shall be suspended until causes of the deficiencies are determined and corrected by the contractor.

b. Procedures.

(1) Quality control provisions shall be provided during the joint cleaning process to prevent or correct improper equipment and cleaning techniques that damage the concrete in any manner. Cleaned joints shall be approved by the Engineer prior to installation of the lubricant/adhesive and preformed joint seal.

(**2)** Conformance to stretching and compression limitations shall be determined by the engineer. After installation, the distance between the marks shall be measured on the pavement. If the stretching or compression exceeds the specified limit, the seal shall be removed and replaced with new joint seal at no additional cost to the owner. The seal shall be removed up to the last correct measurement. The seal shall be inspected a minimum of once per 100 feet of seal for compliance to the shrinkage or compression requirements. Measurements shall also be made as directed to determine conformance with depth and width installation requirements. All preformed seal that is not in conformance with specification requirements shall be removed and replaced with new joint seal at no additional cost to the owner.

c. Product. The joint sealing system (preformed seal and lubricant/adhesive) shall be inspected by the engineer for proper rate of cure and bonding to the concrete, cuts, twists, nicks, and other deficiencies. Seals exhibiting any defects, at any time prior to final acceptance of the project, shall be removed from the joint, wasted, and replaced in a satisfactory manner, as determined by the engineer.

METHOD OF MEASUREMENT

604-6.1 MEASUREMENT. The quantity of each sealing item to be paid for will be determined by actual measurement of the number of linear feet of in-place material that has been approved.

BASIS OF PAYMENT

604-7.1 PAYMENT. Payment will be made at the contract unit bid prices per linear foot for the sealing items scheduled. The unit bid prices shall include the cost of all labor, materials, the use of all equipment, and tools required to complete the work.

Payment. Payment shall be made under:

Item P-604-7.1 Preformed Sealer, 1/2 inch Joint – per linear foot

Item P-604-7.2 Preformed Sealer, 1 inch Joint – per linear foot

TESTING REQUIREMENTS

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in this text by basic designation only.

U.S. ARMY CORPS OF ENGINEERS

CRD C 548 Standard Specification for Jet-Fuel and Heat Resistant Preformed Polychloroprene Elastomeric Joint Seals for Rigid Pavements

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2628 Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements

ASTM D 2835 Lubricant for Installation of Preformed Compression Seals in Concrete Pavements

END ITEM P-604

ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

DESCRIPTION

610-1.1 This item shall consist of **plain and reinforced** structural Portland Cement Concrete (PCC), prepared and constructed in accordance with these specifications, at the locations and of the form and dimensions shown on the plans.

MATERIALS

610-2.1 GENERAL. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

a. Reactivity. Aggregates shall be tested for deleterious reactivity with alkalis in the cement, which may cause excessive expansion of the concrete. Separate tests of coarse and fine aggregate shall be made in accordance with ASTM C 1260. If the expansion of coarse or fine aggregate test specimens, tested in accordance with ASTM C 1260, does not exceed 0.10 % at 28 days (30 days from casting), the coarse or fine aggregates shall be accepted.

If the expansion of any aggregate, coarse or fine, at 28 days is greater than 0.10%, tests of combined materials shall be made in accordance with ASTM C 1567 using the aggregates, cementitious materials, and/or specific reactivity reducing chemicals in the proportions proposed for the mixture design. If the expansion of the proposed combined materials test specimens, tested in accordance with ASTM C 1567, does not exceed 0.10 % at 28 days, the proposed combined materials will be accepted. If the expansion of the proposed combined materials test specimens is greater than 0.10% at 28 days, the aggregates will not be accepted unless adjustments to the combined materials mixture can reduce the expansion to less than 0.10 % at 28 days, or new aggregates shall be evaluated and tested.

610-2.2 COARSE AGGREGATE. The coarse aggregate for concrete shall meet the requirements of ASTM C 33. Crushed stone aggregate shall have a durability factor, as determined by ASTM C 666, greater than or equal to 95. The Engineer may consider and reserve final approval of other State classification procedures addressing aggregate durability.

Coarse aggregate shall be well graded from coarse to fine and shall meet one of the gradations shown in Table 1, using ASTM C 136.

610-2.3 FINE AGGREGATE. The fine aggregate for concrete shall meet the requirements of ASTM C 33.

The fine aggregate shall be well graded from fine to coarse and shall meet the requirements of Table 2 when tested in accordance with ASTM C 136:

Table 1. Gradation For Coarse Aggregate

Sieve Designation (square openings)	Percentage by Weight Passing Sieves						
	2”	1-1/2”	1”	3/4”	1/2”	3/8”	No.4
No. 4 to 3/4 in. (4.75-19.0 mm)			100	90-100		20-55	0-10
No. 4 to 1 in. (4.75-25.0 mm)		100	90-100		25-60		0-10
No. 4 to 1-1/2 in. (4.75-38.1 mm)	100	95-100		35-70		10-30	0-5

Table 2. Gradation For Fine Aggregate

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
3/8 in (9.5 mm)	100
No. 4 (4.75 mm)	95-100
No. 16 (1.18 mm)	45-80
No. 30 (0.60 mm)	25-55
No. 50 (0.30 mm)	10-30
No. 100 (0.15 mm)	2-10

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 mesh sieve may be accepted, provided that such deficiency does not exceed 5 percent and is remedied by the addition of pozzolanic or cementitious materials other than Portland cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 CEMENT. Cement shall conform to the requirements of **ASTM C 150 Type II**.

The Contractor shall furnish vendors’ certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 WATER. The water used in concrete shall be free from sewage, oil, acid, strong alkalis, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested in accordance with AASHTO T 26.

610-2.6 ADMIXTURES. The use of any material added to the concrete mix shall be approved by the Engineer. Before approval of any material, the Contractor shall be required to submit the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolans meeting the requirements of ASTM C 618, Class F or N with the exception of loss of ignition, where the maximum shall be less than 6 percent. Class F fly ash for use in mitigating alkali-silica reactivity shall have a Calcium Oxide (CaO) content of less than 13 percent and a total equivalent alkali content less than 3 percent.

Air-entraining admixtures shall meet the requirements of ASTM C 260. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water-reducing, set-controlling admixtures shall meet the requirements of ASTM C 494, Type A, water-reducing or Type D, water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures in accordance with the manufacturer's printed instructions.

610-2.7 PREMOLDED JOINT MATERIAL. Premolded joint material for expansion joints shall meet the requirements of ASTM **D 1751.**

610-2.8 JOINT FILLER. The filler for joints shall meet the requirements of Item P-605, unless otherwise specified in the proposal.

610-2.9 STEEL REINFORCEMENT. Reinforcing shall consist of Welded Steel Wire Fabric, ASTM A 185 or Bar Mars ASTM A 184 Grade 60**.**

610-2.10 COVER MATERIALS FOR CURING. Curing materials shall conform to one of the following specifications:

Waterproof paper for curing concrete	ASTM C 171
Polyethylene Sheeting for Curing Concrete	ASTM C 171
Liquid Membrane-Forming Compounds for Curing Concrete	ASTM C 309, Type 2

CONSTRUCTION METHODS

610-3.1 GENERAL. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified herein. All machinery and equipment owned or controlled by the Contractor, which he proposes to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610-3.2 CONCRETE COMPOSITION. The concrete shall develop a compressive strength of **3,000** psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The concrete shall contain not less than 470 pounds of cement per cubic yard (280 kg per cubic meter). The concrete shall contain 5 percent of entrained air, plus or minus 1 percent, as determined by ASTM C 231 and shall have a slump of not more than 4 in (10 cm) as determined by ASTM C 143.

610-3.3 ACCEPTANCE SAMPLING AND TESTING. Concrete for each structure will be accepted on the basis of the compressive strength specified in paragraph 3.2. The concrete shall be sampled in accordance with ASTM C 172. Compressive strength specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39.

Concrete cylindrical test specimens shall be made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The Contractor shall cure and store the test specimens under such conditions as directed. The Engineer will make the actual tests on the specimens at no expense to the Contractor.

610-3.4 PROPORTIONING AND MEASURING DEVICES. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610-3.5 CONSISTENCY. The consistency of the concrete shall be checked by the slump test specified in ASTM C 143.

610-3.6 MIXING. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C 94.

610-3.7 MIXING CONDITIONS. The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40 °F (4 °C) without permission of the Engineer. If permission is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50 °F (10 °C) nor more than 100 °F (38 °C). The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his/her expense. Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610-3.8 FORMS. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as designed on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 60% of the design strength of the concrete has developed.

610-3.9 PLACING REINFORCEMENT. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concreting. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.10 EMBEDDED ITEMS. Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610-3.11 PLACING CONCRETE. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 ft (1.5 m), or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610-3.12 CONSTRUCTION JOINTS. When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete that has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610-3.13 EXPANSION JOINTS. Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610-3.14 DEFECTIVE WORK. Any defective work discovered after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610-3.15 SURFACE FINISH. All exposed concrete surfaces shall be true, smooth, and free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610-3.16 CURING AND PROTECTION. All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610-3.17 DRAINS OR DUCTS. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.18 COLD WEATHER PROTECTION. When concrete is placed at temperatures below 40 °F (4 °C), the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50 °F and 100 °F (10 °C and 38 °C).

Calcium chloride may be incorporated in the mixing water when directed by the Engineer. Not more than 2 pounds (908 grams) of Type 1 nor more than 1.6 pounds (726 grams) of Type 2 shall be added per bag of cement. After the concrete has been placed, the Contractor shall provide sufficient protection such as cover, canvas, framework, heating apparatus, etc., to enclose and protect the structure and maintain the temperature of the mix at not less than 50 °F (10 °C) until at least 60% of the designed strength has been attained.

610-3.19 FILLING JOINTS. All joints that require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

METHOD OF MEASUREMENT

610-4.1 Measurement for Item P-610 structural Portland cement concrete will not be made. The costs for this work shall be in the bid items for which direct payment is made.

BASIS OF PAYMENT

610-5.1 No separate payment will be made for this item. The performance of this work and the supplying all materials (including reinforcement) and labor, as indicated, shall be considered as a subsidiary obligation of the contractor under other contract items.

TESTING REQUIREMENTS

ASTM C 31	Making and Curing Test Specimens in the Field
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 138	Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C 143	Slump of Hydraulic Cement Concrete
ASTM C 231	Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C 666	Resistance of Concrete to Rapid Freezing and Thawing
ASTM C 1077	Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM C 1260	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)

MATERIAL REQUIREMENTS

ASTM A 184	Specification for Fabricated Deformed Steel Bar or Rod Mats for Concrete Reinforcement
ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 497	Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
ASTM A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A 704	Welded Steel Plain Bars or Rod Mats for Concrete Reinforcement
ASTM C 33	Concrete Aggregates
ASTM C 94	Ready-Mixed Concrete
ASTM C 150	Portland Cement
ASTM C 171	Sheet Materials for Curing Concrete
ASTM C 172	Sampling Freshly Mixed Concrete
ASTM C 260	Air-Entraining Admixtures for Concrete
ASTM C 309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C 494	Chemical Admixtures for Concrete
ASTM C 595	Blended Hydraulic Cements
ASTM C 618	Coal Flyash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
ASTM D 1751	Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
ASTM D 1752	Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
AASHTO T 26	Quality of Water to be Used in Concrete

END OF ITEM P-610

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ITEM P-620 RUNWAY AND TAXIWAY PAINTING

DESCRIPTION

620-1.1 This item shall consist of the painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

MATERIALS

620-2.1 MATERIALS ACCEPTANCE. The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site.

620-2.2 PAINT. Paint shall be waterborne or preformed thermoplastic in accordance with the requirements of paragraph **620-2.2a or 620-2.2e**. Paint shall be furnished in White – 37925, Yellow - 33538 or 33655, Green (tint to be coordinated with the airport) and Black - 37038 in accordance with Federal Standard No. 595.

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

b. Epoxy. Paint shall be a two component, minimum 99 percent solids type system conforming to the following:

(1) Pigments. Component A. Percent by weight.

(a) White:
Titanium Dioxide, ASTM D 476, type II shall be 18 percent minimum (16.5 percent minimum at 100 percent purity).
(b) Yellow and Colors:
Titanium Dioxide, ASTM D 476, type II shall be 14 to 17 percent.
Organic yellow, other colors, and tinting as required to meet color standard.
Epoxy resin shall be 75 to 79 percent.

(2) Epoxy Content. Component A. The weight per epoxy equivalent, when tested in accordance with ASTM D 1652 shall be the manufacturer's target plus or minus 50.

(3) Amine Number. Component B. When tested in accordance with ASTM D 2074 shall be the manufacturer's target plus or minus 50.

(4) Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

(5) Daylight Directional Reflectance.

(a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.

(b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 38 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462	x .470	x .479	x .501
y .438	y .455	y .428	y .452

(6) Accelerated Weathering.

(a) Sample Preparation. Apply the paint at a wet film thickness of 0.013 in (0.33 mm) to four 3 by 6 in (8 by 15 cm) aluminum panels prepared as described in Federal Test Method Standard No. 141D/GEN, Method 2013. Air dry the sample 48 hours under standard conditions.
(b) Testing Conditions. Test in accordance with ASTM G 15453 using both Ultra Violet (UV-B) Light and condensate exposure, 72 hours total, alternating 4 hour UV exposure at 60 degree C, and 4 hours condensate exposure at 40 °C.
(c) Evaluation. Remove the samples and condition for 24 hours under standard conditions. Determine the directional reflectance and color match using the procedures in paragraph 620-2.2b(5) above. Evaluate for conformance with the color requirements.

(7) Volatile Organic Content. Determine the volatile organic content in accordance with 40 CFR Part 60 Appendix A, Method 24.

(8) Dry Opacity. Use Procedure B, Method B of Method 4121 of Federal Test Method Standard No. 141D/GEN. The wet film thickness shall be 0.015 in (0.12 mm). The minimum opacity for white and colors shall be 0.92.

(9) Abrasion Resistance. Subject the panels prepared in paragraph 620-2.2b(6) to the abrasion test in accordance with ASTM D 968, Method A, except that the inside diameter of the metal guide tube shall be from 0.747 to 0.750 in (18.97 to 19.05 mm). Five liters of unused sand shall be used for each test panel. The test shall be run on two test panels. [Note: five liters of sand weighs 17.5 lb. (7.94 kg).] Both baked and weathered paint films shall require not less than 150 liters of sand for the removal of the paint films.

(10) Hardness, Shore. Hardness shall be at least 80 when tested in accordance with ASTM D 2240.

c. Methacrylate. Paint shall be a two component, minimum 99 percent solids-type system conforming to the following:

(1) Pigments. Component A. Percent by weight.
(a) White:
Titanium Dioxide, ASTM D 476, type II shall be 6 percent minimum.
Methacrylate resin shall be 18 percent minimum.
(b) Yellow and Colors:
Titanium Dioxide, ASTM D 476, type II shall be 6 percent minimum.
Organic yellow, other colors, and tinting as required to meet color standard.
Methacrylate resin shall be 18 percent minimum.

(2) Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

(3) Daylight Directional Reflectance:

(a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.
(b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 45 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462	x .470	x .479	x .501
y .438	y .455	y .428	y .452

(4) Accelerated Weathering.

(a) Sample Preparation. Apply the paint at a wet film thickness of 0.013 in (0.33 mm) to four 3 by 6 in (8 by 15 cm) aluminum panels prepared as described in Method 2013 of Federal Test Method Standard No. 141D/GEN. Air dry the sample 48 hours under standard conditions.
(b) Testing Conditions. Test in accordance with ASTM G 53 154 using both Ultra Violet (UV-B) Light and condensate exposure, 72 hours total, alternating 4 hour UV exposure at 60 degree C, and 4 hours condensate exposure at 40 °C.
(c) Evaluation. Remove the samples and condition for 24 hours under standard conditions. Determine the directional reflectance and color match using the procedures in paragraph 620-2.2c(3) above. Evaluate for conformance with the color requirements.

(5) Volatile Organic Content. Determine the volatile organic content in accordance with 40 CFR Part 60 Appendix A, Method 24.

(6) Dry Opacity. Use Procedure B, Method B of Method 4121 of Federal Test Method Standard No. 141D/GEN. The wet film thickness shall be 0.015 in (0.12 mm). The minimum opacity for white and colors shall be 0.92.

(7) Abrasion Resistance. Subject the panels prepared in paragraph 620-2.2c(4) to the abrasion test in accordance with ASTM D 968, Method A, except that the inside diameter of the metal guide tube shall be from 0.747 to 0.750 in (18.97 to 19.05 mm). Five liters of unused sand shall be used for each test panel. The test shall be run on two test panels. [Note: 5 liters of sand weighs 17.5 lb. (7.94 kg).] Both baked and weathered paint films shall require not less than 150 liters of sand for the removal of the paint films.

(8) Hardness, Shore. Hardness shall be at least 80 when tested in accordance with ASTM D 2240.

d. Solvent-Base. Paint shall meet the requirements of Federal Specification A-A-2886A Type I or Type II.

e. Preformed Thermoplastic Airport Pavement Markings. Markings must be composed of ester modified resins in conjunction with aggregates, pigments, and binders that have been factory produced as a finished product. The material must be impervious to degradation by aviation fuels, motor fuels, and lubricants.

(1) The markings must be able to be applied in temperatures as low as 35 ºF without any special storage, preheating, or treatment of the material before application.

(a) The markings must be supplied with an integral, non-reflectorized black border.

(2) Graded Glass Beads.

(a) The material must contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall conform to Federal Specification, TT-B-1325D, Type I, gradation A.

(b) The material must have factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 10 sq. ft. These factory applied coated surface beads shall have a minimum of 90% true spheres, minimum refractive index of 1.50, and meet the following gradation.

Size Gradation		Retained, %	Passing, %
US Mesh	µm		
12	1700	0 - 2%	98 - 100%
14	1400	0 - 3.5%	96.5 - 100%
16	1180	2 - 25%	75 - 98%
18	1000	28 - 63%	37 - 72%
20	850	63 - 72%	28 - 37%
30	600	67 - 77%	23 - 33%
50	300	89 - 95%	5 - 11%
80	200	97 - 100%	0 - 3%

(3) Heating Indicators. The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.

(4) Pigments. Percent by weight.

(a) White:

Titanium Dioxide, ASTM D 476, type II shall be 10 percent minimum.

(b) Yellow and Colors:

Titanium Dioxide, ASTM D 476, type II shall be 1 percent minimum.

Organic yellow, other colors, and tinting as required to meet color standard.

(5) Prohibited Materials. The manufacturer shall certify that the product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

(6) Daylight Directional Reflectance.

(a) White: The daylight directional reflectance of the white paint shall not be less than 75 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN, Method 6121.

(b) Yellow: The daylight directional reflectance of the yellow paint shall not be less than 45 percent (relative to magnesium oxide), when tested in accordance with Federal Test Method Standard No. 141D/GEN. The x and y values shall be consistent with the Federal Hegman yellow color standard chart for traffic yellow standard 33538, or shall be consistent with the tolerance listed below:

x .462	x .470	x .479	x .501
y .438	y .455	y .428	y .452

(7) Skid Resistance. The surface, with properly applied and embedded surface beads, must provide a minimum resistance value of 45 BPN when tested according to ASTM E303.

(8) Thickness. The material must be supplied at a nominal thickness of 65 mil (1.7 mm).

(9) Environmental Resistance. The material must be resistant to deterioration due to exposure to sunlight, water, salt, or adverse weather conditions and impervious to aviation fuels, gasoline, and oil.

(10) Retroreflectivity. The material, when applied in accordance with manufacturer's guidelines, must demonstrate a uniform level of nighttime retroreflection when tested in accordance to ASTM E1710.

(11) Packaging. A protective film around the box must be applied in order to protect the material from rain or premature aging.

(12) Manufacturing Control and ISO Certification. The manufacturer must be ISO 9001:2000 certified and provide proof of current certification. The scope of the certification shall include manufacture of reflective markings.

a. The markings must be a resilient thermoplastic product with uniformly distributed glass beads throughout the entire cross-sectional area. The markings must be resistant to the detrimental effects of aviation fuels, motor fuels and lubricants, hydraulic fluids, de-icers, anti-icers, protective coatings, etc. Lines, legends, and symbols must be capable of being affixed to bituminous and/or Portland cement concrete pavements by the use of a large radiant heater. Colors shall be available as required.

b. The markings must be capable of conforming to pavement contours, breaks, and faults through the action of airport traffic at normal pavement temperatures. The markings must be capable of fully conforming to grooved pavements, including pavement grooving per FAA AC 150/5320-12, current version. The markings shall have resealing characteristics, such that it is capable of fusing with itself and previously applied thermoplastics when heated with a heat source per manufacturer's recommendation.

c. Multicolored markings must consist of interconnected individual pieces of preformed thermoplastic pavement marking material, which through a variety of colors and patterns, make up the desired design. The individual pieces in each large marking segment (typically more than 20 ft. long) must be factory assembled with a compatible material and interconnected so that in the field it is not necessary to assemble the individual pieces within a marking segment. Obtaining multicolored effect by overlaying materials of different colors is not acceptable due to resulting inconsistent marking thickness and inconsistent application temperature in the marking/substrate interface.

d. The marking material must set up rapidly, permitting the access route to be re-opened to traffic a maximum of 15 minutes after application.

e. The marking material shall have an integral color throughout the thickness of the marking material.

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

Paint Color	Glass Beads, Type I, Gradation A	Glass Beads, Type III	Glass Beads, Type IV
White	See Table 1.	See Table 1.	See Table 1.
Yellow	See Table 1.	See Table 1.	See Table 1.
Red	See Table 1 and Note.	Not used.	See Table 1 and Note.
Pink	See Table 1 and Note.	Not used.	See Table 1 and Note.
Black	Not used.	Not used.	See Table 1 and Note.

CONSTRUCTION METHODS

620-3.1 WEATHER LIMITATIONS. The painting shall be performed only when the surface is dry and when the surface temperature is at least 45 °F (7 °C) and rising and the pavement surface temperature is at least 5 °F (2.7 °C) above the dew point. Painting operations shall be discontinued when the surface temperature exceeds the maximum temperature based on the paint manufactures recommendations. Markings shall not be applied when the pavement temperature is greater than 120 °F (49 °C).

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

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

620-3.3 PREPARATION OF SURFACE. Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material that would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials without damage to the pavement surface. Use of any chemicals or impact abrasives during surface preparation shall be approved in advance by the Engineer. Paint shall not be applied to Portland cement concrete pavement until the areas to be painted are clean of curing material. Sandblasting or high-pressure water shall be used to remove curing materials.

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

Dimension and Spacing	Tolerance
36 in (910 mm) or less	±1/2 in (12 mm)
greater than 36 in to 6 ft (910 mm to 1.85 m)	± 1 in (25 mm)
greater than 6 ft to 60 ft (1.85 m to 18.3 m)	± 2 in (51 mm)
greater than 60 ft (18.3 m)	± 3 in (76 mm)

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 1. The addition of thinner will not be permitted. A period of **30 days** shall elapse between placement of a bituminous surface course or seal coat and application of the paint.

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

Paint Type	Paint Sq ft per gallon, ft^2/gal.	Glass Beads, Type I, Gradation A Pounds per gallon of paint-lb./gal.	Glass Beads, Type III Pounds per gallon of paint-lb./gal.	Glass Beads, Type IV Pounds per gallon of paint-lb./gal.
Waterborne	115 ft2/gal. max	*	10 lb./gal. min	*
Note: The glass bead application rate for Red and Pink paint shall be reduced by 2 lb./gal. (0.24 kg/l) for Type I and Type IV beads. Type III beads shall not be applied to Red or Pink paint.				

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. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made.

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

620-3.6 APPLICATION--PREFORMED AIRPORT PAVEMENT MARKINGS.

a. Asphalt and Portland cement To ensure minimum single-pass application time and optimum bond in the marking/substrate interface, the materials must be applied using a variable speed self-propelled mobile heater with an effective heating width of no less than 16 ft (4.88 m) and a free span between supporting wheels of no less than 18 ft (5.49 m). The heater must emit thermal radiation to the marking material in such a manner that the difference in temperature of 2 in (5.08 cm) wide linear segments in the direction of heater travel must be within 5 percent of the overall average temperature of the heated thermoplastic material as it exits the heater. The material must be able to be applied at ambient and pavement temperatures down to 35 ºF (2 °C) without any preheating of the pavement to a specific temperature. The material must be able to be applied without the use of a thermometer. The pavement shall be clean, dry, and free of debris. A non-VOC sealer with a maximum applied viscosity of 250 centiPoise (ASTM D 2393) must be applied to the pavement shortly before the markings are applied. The supplier must enclose application instructions with each box/package.

620-3.7 PROTECTION AND CLEANUP. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose or unadhered reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations.

620-3.8 PAVEMENT MARKING REMOVAL. Pavement markings shall be removed by a method that will not damage the underlying pavement and leave an objectionable shadow. Prior to beginning full scale removal, the Contractor shall demonstrate to the City of San Antonio the method and effectiveness of the removal process on a section of paint no less than 50 square feet. To be considered acceptable, the process employed must remove the paint without damage to the underlying pavement and leaving an objectionable shadow, as determined by the Engineer. Once the method of removal has been accepted, the Contractor shall remove the paint on the designated areas. Any residue from the removal operation shall be removed from the area by employing a vacuum truck.

METHOD OF MEASUREMENT

620-4.1 The quantity of runway and taxiway markings to be paid for shall be the number of square feet of painting and the square feet of preformed markings performed in accordance with the specifications and accepted by the Engineer. Reflective media will not be measured for payment.

620-4.2 The quantity of surface painted Holding Position Signs to be paid for shall be each of the holding position signs installed in accordance with the specifications and accepted by the Engineer.

620-4.3 The quantity of markings to be obliterated paid for shall be the number of square feet of permanent marking removed and removal of temporary taxiway paint will not be measured for payment.

BASIS OF PAYMENT

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

620-5.2 Payment shall be made at the respective contract price per each for Holding Position Sign. This price shall be full compensation for furnishing aluminum stencils all materials and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-620-5.1 Reflective Yellow Taxiway Pavement Markings, Waterborne - per square foot

Item P-620-5.2 Reflective White Runway Pavement Markings, Waterborne - per square foot

Item P-620-5.3 Non-Reflective Black Pavement Markings, Waterborne - per square foot

Item P-620-5.4 Reflective Holding Position Markings, Pre-formed Thermoplastic - per square foot

Item P-620-5.5 Reflective Surface Painted Holding Position Signs, Pre-formed Thermoplastic - per each

Item P-620-5.6 Non-Reflective Green Infield Pavement Markings, Waterborne - square foot

Item P-620-5.7 Pavement Making Obliteration

TESTING REQUIREMENTS

ASTM C 136	Sieve Analysis of Fine and Coarse Aggregates
ASTM C 146	Chemical Analysis of Glass Sand
ASTM C 371	Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D 92	Test Method for Flash and Fire Points by Cleveland Open Cup
ASTM D 711	No-Pick-Up Time of Traffic Paint
ASTM D 968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1213-54 (1975)	Test Method for Crushing Resistance of Glass Spheres
ASTM D 1652	Test Method for Epoxy Content of Epoxy Resins
ASTM D 2074	Test Method for Total Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D 2240	Test Method for Rubber Products-Durometer Hardness
ASTM G 15453	Operating Light and Water-Exposure Apparatus (Fluorescent Light Apparatus UV-Condensation Type) for Exposure of Nonmetallic Materials.
Federal Test Method Standard No. 141D/GEN	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing
	MATERIAL REQUIREMENTS
ASTM D 476	Specifications for Dry Pigmentary Titanium Dioxide Pigments Products
Code of Federal Regulations	40 CFR Part 60, Appendix A – Definition of Traverse Point Number and Location
Code of Federal Regulations	29 CFR Part 1910.1200 – Hazard Communications
FED SPEC TT-B-1325D	Beads (Glass Spheres) Retroreflective
AASHTO M 247	Glass Beads Used in Traffic Paints
FED SPEC TT-P-1952E	Paint, Traffic and Airfield Marking, Waterborne
Commercial Item Description (CID) A-A-2886B	Paint, Traffic, Solvent Based
FED STD 595	Colors used in Government Procurement

END OF ITEM P-620

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ITEM P-621 SAW-CUT GROOVES

DESCRIPTION

621-1.1 This item consists of providing a skid resistant surface that prevents hydroplaning during wet weather in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer.

CONSTRUCTION METHODS

621-2.1 Transverse grooves saw-cut in the pavement must form a 1/4 in wide by 1/4 in deep by 1 1/2 in center-to-center configuration. The grooves must be continuous for the entire runway length. They must be saw-cut transversely in the runway pavement to not less than **10 ft** from the runway pavement edge to allow adequate space for equipment operation. The Contractor must provide a grooving machine of a type equipped with diamond-saw cutting blade groove cutting head capable of making at least 18 in in width of multiple parallel grooves in one pass of the machine. Thickness of the cutting blades shall be capable of making the required width and depth of grooves in one pass of the machine. The cutting head shall not contain a mixture of new and worn blades or blades of unequal wear or diameter. The wheels on the grooving machine shall be of a design that will not scar or spall the pavement. The machine must be equipped with devices to control depth of groove and alignment within the specified tolerances.

The saw-cut grooves must meet the following tolerances. The tolerances apply to each day's production and to each piece of grooving equipment used for production. The Contractor is responsible for all controls and process adjustments necessary to meet these tolerances.

Alignment tolerance.

Plus or minus 1-1/2 in in alignment for 75 ft.

Groove tolerance.

Depth. The standard depth is 1/4 in. At least 90 percent of the grooves must be at least 3/16 in, at least 60 percent of the grooves must be at least 1/4 in, and not more than 10 percent of the grooves may exceed 5/16 in.

Width. The standard width is 1/4 in. At least 90 percent of the grooves must be at least 3/16 in, at least 60 percent of the grooves must be at least 1/4 in, and not more than 10 percent of the grooves may exceed 5/16 in.

Center-to-center spacing.

The standard spacing is 1-1/2 in.
Minimum spacing 1-3/8 in.
Maximum spacing 1-1/2 in.

Saw-cut grooves must not be closer than 3 in or more than 9 in from transverse paving joints. Grooves must not be closer than 6 in and no more than 18 in from in-pavement light fixtures. Grooves may be continued through longitudinal joints. Where neoprene compression seals have been installed and the compression seals are recessed sufficiently to prevent damage from the grooving operation. grooves may be continued through the longitudinal joints. Where neoprene compression seals have been installed and the compression seals are not recessed sufficiently to prevent damage from the grooving operation, grooves must not be closer than 3 in or more than 5 in from the longitudinal joints.

621-2.3 ENVIRONMENTAL REQUIREMENTS. Grooving operations will not be permitted when freezing conditions prevent the immediate removal of debris and/or drainage of water from the grooved area.

621-2.4 EXISTING PAVEMENTS. Bumps, depressed areas, bad or faulted joints, and badly cracked and/or spalled areas in the pavement shall not be grooved until such areas are adequately repaired or replaced.

621-2.5 NEW PAVEMENTS. New asphalt concrete pavements shall be allowed to cure for a minimum of **30 days** before grooving, to allow the material to become stable enough to prevent closing of the grooves under normal use. Permit new Portland cement concrete pavements to cure for a minimum of 28 days before grooving. Spalling along or tearing or raveling of the groove edges shall not be allowed.

621-2.6 CLEAN-UP. During and after installation of saw-cut grooves, the Contractor must remove from the pavement all debris, waste, and by-products generated by the operations to the satisfaction of the Engineer. Cleanup of waste material must be continuous during the grooving operation Flush debris produced by the machine to the edge of the grooved area or pick it up as it forms. The dust coating remaining shall be picked up or flushed to the edge of the area if the resultant accumulation is not detrimental to the vegetation or storm drainage system. Accomplish all flushing operations in a manner to prevent erosion on the shoulders Waste material must be disposed of in an approved manner. Waste material must not be allowed to enter the airport storm or sanitary sewer system. The Contractor must dispose of these wastes in strict compliance with all applicable state, local, and Federal environmental statutes and regulations

621-2.7 REPAIR OF DAMAGED PAVEMENT. Grooving must be stopped and damaged pavement repaired at the Contractor's expense when in the opinion of the Engineer the result of the grooving operation will be detrimental to aircraft tires.

ACCEPTANCE

621-3.1 ACCEPTANCE TESTING. Grooves will be accepted based on results of zone testing. All acceptance testing necessary to determine conformance with the groove tolerances specified will be performed by the Engineer.

Instruments for measuring groove width and depth must have a range of at least 0.5 in and a resolution of at least 0.005 in. Gauge blocks or gauges machined to standard grooves width, depth, and spacing may be used.

Instruments for measuring center-to-center spacing must have a range of at least 3 in and a resolution of at least 0.02 in.

The Engineer will measure grooves in five zones across the pavement width. Measurements will be made at least THREE times during each day's production. Measurements in all zones will be made for each cutting head on each piece of grooving equipment used for each day's production.
The five zones are as follows:

Zone 1	Centerline to 5 ft left or right of the centerline.
Zone 2	5 ft to 25 ft left of the centerline.
Zone 3	5 ft 25 ft right of the centerline.
Zone 4	25 ft to edge of grooving left of the centerline.
Zone 5	25 ft to edge of grooving right of the centerline.

At a random location within each zone, five consecutive grooves sawed by each cutting head on each piece of grooving equipment will be measured for width, depth, and spacing. The five consecutive measurements must be located about the middle blade of each cutting head plus or minus 4 in. Measurements will be made along a line perpendicular to the grooves.

Width or depth measurements less than 0.170 in shall be considered less than 3/16 in.
Width or depth measurements more than 0.330 in shall be considered more than 5/16 in.
Width or depth measurements more than 0.235 in shall be considered more than 1/4 in.
Production Must Be Adjusted When More Than One Groove On A Cutting Head Fails To Meet The Standard Depth, Width, Or Spacing In More Than One Zone.

The Contractor shall provide a written report produced by their Quality Control personnel indicating the percentage of grooves that meet tolerances and indicating how many times production was adjusted. Blade wear and surface variability may require more testing than the minimum of three per day per equipment. It is expected that the Contractor will routinely spot check for compliance each time the equipment aligns for a grooving pass.

MEASUREMENT AND PAYMENT

621-4.1 PAYMENT FOR SAW-CUT GROOVING. Payment for saw-cut grooving will be made at the contract unit price per square yard for saw-cut grooving. This price shall include vacuum and disposal of all saw cut slurry immediately after the grooving operations.

Payment shall be made under:

Item P-621-4.1 Concrete Pavement Saw Cut Grooving (Runway) – per square yard

END OF ITEM P-621

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ITEM D-701 PIPE FOR STORM DRAINS AND CULVERTS

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below.

> **
> **The Engineer should indicate the required class, schedule, SDR, gauge, and/or strength of pipe desired.**
> **

701-2.2 PIPE. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements.

ASTM C 655	Reinforced Concrete D-Load Pipe

701-2.3 CONCRETE. Concrete for pipe cradles shall have a minimum compressive strength of 2000 psi (13.8 MPa) at 28 days and conform to the requirements of ASTM C 94.

701-2.4 RUBBER GASKETS. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C 443.

701-2.5 JOINT MORTAR. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.

701-2.6 JOINT FILLERS. Poured filler for joints shall conform to the requirements of ASTM D 1190.

701-2.8. CONTROLLED LOW STRENGTH MATERIAL (CLSM). Controlled low strength material shall conform to the requirements of Item P-153. When CLSM is used all joints shall have gaskets.

CONSTRUCTION METHODS

701-3.1 EXCAVATION. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 6 in (150 mm) on each side. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 12 in (300 mm) or ½ in (12 mm) for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal diameter of the pipe. The width of the excavation shall be at least 1 ft (30 cm) greater than the horizontal outside diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 in (150 mm) in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Engineer shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes that are placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 BEDDING. The pipe bedding shall conform to the class specified on the plans. When no bedding class is specified or detailed on the plans, the requirements for Class C bedding shall apply.

a. Rigid Pipe. Class A bedding shall consist of a continuous concrete cradle conforming to the plan details.

Class B bedding shall consist of a bed of granular material having a thickness of at least 6 in (150 mm) below the bottom of the pipe and extending up around the pipe for a depth of not less than 30 percent of the pipe's vertical outside diameter. The layer of bedding material shall be shaped to fit the pipe for at least 10 percent of the pipe's vertical diameter and shall have recesses shaped to receive the bell of bell and spigot pipe. The bedding material shall be sand or selected sandy soil, all of which passes a 3/8 in (9 mm) sieve and not more than 10 percent of which passes a No. 200 (0.075 mm) sieve.

Class C bedding shall consist of bedding the pipe in its natural foundation to a depth of not less than 10 percent of the pipe's vertical outside diameter. The bed shall be shaped to fit the pipe and shall have recesses shaped to receive the bell of bell and spigot pipe.

701-3.3 LAYING PIPE. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced pipes shall be placed with the manufacturer's top of pipe mark within five degrees of a vertical plane through the longitudinal axis of the pipe.

701-3.4 JOINING PIPE. Joints shall be made with (1) Portland cement mortar, (2) Portland cement grout, (3) rubber gaskets, (4) plastic gaskets, or (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints in order to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete Pipe. Concrete pipe may be either bell and spigot or tongue and groove. The method of joining pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even. Joints shall be thoroughly wetted before mortar or grout is applied.

701-3.5 BACKFILLING. Pipes shall be inspected before any backfill is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense.

For pipes placed under taxiway, connecting taxiway, aprons or associated shoulder pavements, backfill shall consist of ½ sack CLSM conforming to, and placed in accordance with, Item P-153 placed from the top of the pipe bedding to one foot above the top of the pipe. The remaining backfill in these areas shall be select material meeting the requirements of, and placed in accordance with, Item P-152 compacted to not less than 100% density as determined by ASTM D 1557. The select backfill shall be placed up to the bottom of the overlying pavement base course.

For pipes placed under infields or other non-aircraft loaded pavements, material for backfill shall be fine, readily compatible soil, granular material selected from the excavation or a source of the Contractor's choosing or shall meet the requirements of Item P-153. . It shall not contain frozen lumps, stones that would be retained on a 2 in (50.0 mm) sieve, chunks of highly plastic clay, or other objectionable material. No less than 95 percent of a granular backfill material shall pass through a 1/2 in (12 mm) sieve, and no less than 95 percent of it shall be retained on a No. 4 (4.75 mm) sieve.

When the top of the pipe is even with or below the top of the trench, the backfill shall be compacted in layers not exceeding 6 in (150 mm) on both sides of the pipe and shall be brought up 1 ft (30 cm) above the top of the pipe or to natural ground level, whichever is greater. Care shall be exercised to thoroughly compact the backfill material under the haunches of the pipe. Material shall be brought up evenly on both sides of the pipe.

When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding 6 in (150 mm) and shall be brought up evenly on both sides of the pipe to 1 ft (30 cm) above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the pipe's diameter or 12 ft (3.5 m), whichever is less.

For PVC and polyethylene pipe, the backfill shall be placed in two stages; first to the top of the pipe and then at least 12 in (300 mm) over the top of the pipe. The backfill material shall meet the requirements of paragraph 701-3.2c.

All backfill shall be compacted to the density required under Item P-152.

METHOD OF MEASUREMENT

701-4.1 The length of pipe shall be measured in linear feet of pipe in place, completed, and approved. It shall be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types and size shall be measured separately. All fittings shall be included in the footage as typical pipe sections in the pipe being measured.

701-4.2 The volume of concrete for pipe cradles to be paid for shall be the number of cubic yards (cubic meters) of concrete that is completed in place and accepted.

BASIS OF PAYMENT

701-5.1 Payment will be made at the contract unit price per linear foot for each kind of pipe of the type and size designated and at the contract unit price per each for concrete for pipe cradles.

These prices shall fully compensate the Contractor for furnishing all materials and for all preparation, excavation, and installation of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item 701-5.1	24-inch RGRCP, Class V- per linear foot
Item 701-5.2	30-inch RGRCP, Class V- per linear foot
Item 701-5.3	42-inch RGRCP, Class V- per linear foot
Item 701-5.4	Concrete Pipe Collar-per each

MATERIAL REQUIREMENTS

ASTM A 760	Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A 761	Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A 762	Corrugated Steel-Pipe, Polymer Precoated for Sewers and Drains
ASTM A 849	Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM A 885/A 885M-96	Steel Sheet, Zinc and Aramid Fiber Composite Coated for Corrugated Steel Sewer, Culvert, and Underdrain Pipe
ASTM B 745	Corrugated Aluminum Alloy Culvert Pipe
ASTM C 14	Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 94	Ready Mixed Concrete
ASTM C 144	Aggregate for Masonry Mortar
ASTM C 150	Portland Cement
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 506	Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C 507	Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C 655	Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C 1433	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM D 1056	Flexible Cellular Materials-Sponge or Expanded Rubber
ASTM D 3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D 6690	Joint and Crack Sealants, Hot-Applied, for Concrete and Asphalt Pavements
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 667	Large Diameter Corrugated Polyethylene Pipe and Fittings
ASTM F 714	Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTM F 794	Poly (Vinyl Chloride) Ribbed Drain Pipe & Fittings Based on Controlled Inside Diameter
ASTM F 894	Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F 2435	Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F 2562	Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure

	Drainage and Sewerage.
ASTM F 949	Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
AASHTO M 190	Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 196	Corrugated Aluminum Alloy Culverts and Underdrains
AASHTO M 198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M 219	Aluminum Alloy Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 243	Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 252	Corrugated Polyethylene Drainage Tubing
AASHTO M 294M	Corrugated Polyethylene Pipe, 300 to 1200 mm Diameter
AASHTO M 304	Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP-20	Steel Reinforced Polyethylene (PE) Ribbed Pipe

END ITEM D-701

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ITEM D-705 PIPE UNDERDRAINS FOR AIRPORTS

DESCRIPTION

705-1.1 GENERAL. This item shall consist of the construction of PVC pipe drains or Underdrains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

705-2.1 GENERAL. Materials shall meet the requirements shown on the plans and specified below.

705-2.2 PIPE. The pipe shall be as shown on the plans and shall be in accordance with the following requirements.

a. Smooth-Wall PVC Pipe for perforated and non-perforated pipe applications. Pipe shall be SDR 26 conforming to ASTM D 3034. All pipe joints shall be gasketed sewer fittings manufactured in accordance with ASTM D 3034. Fitting Gaskets shall comply with ASTM F 477 or ASTM F 913.

705-2.3 ELASTOMERIC SEALS. Elastomeric seals shall conform to the requirements of ASTM F 477.

705-2.4 UNDERDRAIN BEDDING. Underdrain bedding shall be free of clay, humus, or other objectionable matter, and shall conform to MDOT coarse aggregate 17A. Wash bedding material prior to use to minimize finer particles passing No. 4 sieve.

705-2.5. GRANULAR MATERIAL. Granular material used for backfilling shall conform to the requirements of MDOT Coarse Aggregate 6A or 6AA materials.

705-2.6. FILTER FABRIC. The filter fabric shall be non-woven and conform to the requirements of AASHTO M 288-99, Class 2.

TABLE 2

Fabric Property	Test Method	Test Requirement
Weight (Typical), oz/yd^2	ASTM D 5261	6.0
Grab Tensile Strength, lbs	ASTM D 4632	160
Grab Tensile Elongation %	ASTM D 4632	50
Trapezoid Tear Strength, lbs	ASTM D 4533	65
Puncture Resistance, lbs	ASTM D 4833	90
Mullen Burst, psi	ASTM D 3786	315
Permittivity, sec^{-1}	ASTM D 4491	1.6
Water Flow, gpm/ft^2	ASTM D 4491	110
A.O.S., U.S. sieve	ASTM D 4751	70
U.V. Resistance, % (UV Stability) (Strength Retained - %)	ASTM D 4355 *(500 hrs exposure)	70

705-2.7. CONTROLLED LOW STRENGTH MATERIAL (CLSM). As needed

705-2.8. CLEANOUT. The cleanout surface fitting shall consist of Neenah Foundry Co. R-1978-A2 or approved equal with a bolted lid or approved equal, and set in P-610 concrete as shown on the plans.

CONSTRUCTION METHODS

705-3.1 EQUIPMENT. All equipment necessary and required for the proper construction of pipe underdrains shall be on the project, in first-class working condition, and approved by the Engineer before construction is permitted to start.

705-3.2 EXCAVATION. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but shall not be less than the external diameter of the pipe plus 6 inches on each side. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay, sand or gravel, and lightly compacted in layers not over 6 inches in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved material for the full trench width. The Engineer shall determined the depth of removal necessary. The approved material shall be compacted to provide adequate support for the pipe.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the Engineer. The excavation shall not be carried below the required depth; when this is done, the trench shall be backfilled at the Contractor's expense with material approved by the Engineer and compacted to the density of the surrounding earth material.

The bed for the pipe shall be so shaped that at least the lower quarter of the pipe shall be in continuous contact with the bottom of the trench. Spaces for the pipe bell shall be excavated accurately to size to clear the bell so that the barrel supports the entire weight of the pipe.

The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the completion of the backfill to at least 12 inches over the top of the pipe. The sheathing or shoring shall be pulled as the backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per foot for the pipe.

During excavation the existing underdrain located under the runways existing bituminous shoulder shall be removed as noted on the plans.

When unknown existing underdrains are encountered they shall be re-routed to empty into new underdrain or into new underdrain granular backfill trench as directed by the engineer. When encountered in the existing bituminous shoulder area, the shoulder shall be removed as noted on the plans.

705-3.3 LAYING AND INSTALLING PIPE.

a. PVC Pipe. PVC pipe shall be installed in accordance with the requirements of ASTM D 2321 or AASHTO Standard Specification for Highway Bridges Section 30. Perforations shall meet the requirements of AASHTO M or M 294 Class 2. Provide 4 rows of perforations 3/16 inch diameter at 90 degrees and at 160degrees apart centered at bottom, and with a longitudinal spacing of 2.50 inches. The vertical tolerance for placing the PVC underdrain pipe shall be plus or minus 0.10 feet. The horizontal tolerance for placing the PVC underdrain pipe shall be plus or minus 0.50 feet. Any PVC underdrain pipe that is placed out of tolerance shall be removed and replaced by the Contractor at no additional cost to the WCAA.

The upper end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the Engineer.

Unless otherwise shown on the plans, a 4-inch bed of bedding material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains. Install underdrains per detail shown on the plans

Pipe outlets for the underdrains shall be constructed as shown on the plans. The pipe shall be laid with tight-fitting joints. Bedding is not required around or over non-perforated pipe outlets for underdrains. All connections to other drainage pipes or structures shall be made in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the plans.

Contractor shall field verify the location and depth of existing underdrains. When working around, over or under existing underdrains contractor shall protect existing underdrain system from damage. Required adjustments to new underdrains to miss existing underdrains shall be determined as conflicts are encountered. When making any required underdrain adjustments, the contractor shall use necessary bends to ensure the new underdrains are constructed at a positive gravity slope and always have a minimum of 42 inch cover. Contractor shall notify the Engineer if conflicts cannot be resolved.

b. Filter Fabric. The filter fabric shall be installed in accordance with the manufacturer's recommendations, and in accordance with AASHTO M 288-99, unless otherwise shown on the plans. All lap joints shall be a minimum of 12 inches unless noted.

c. All taps into existing manholes and catch basins for new underdrain shall be core drilled two pipe sizes larger. Openings shall be mortared after installation both inside and outside of structure.

705-3.4 MORTAR. The mortar shall be of the desired consistency for making connections to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted

705-3.5 BACKFILLING.

a. Earth. All trenches and excavations shall be backfilled within a reasonable time after the pipes are installed, unless other protection of the pipe is directed. The backfill material shall be selected material from excavation or borrow; material which is placed within a nominal pipe diameter distance at the sides of the pipe and 1 foot over the top shall be material that can be readily compacted. It shall not contain stones retained on a 3-inch sieve, frozen lumps, chunks of highly plastic clay, or any other material that is objectionable to the Engineer. The material shall be moistened or dried, if necessary to be compacted by the method in use. Backfill material shall be approved by the Engineer. Special care shall be taken in placing the backfill. Great care shall be used to obtain thorough compaction under the haunches and along the sides to the top of the pipe.

The backfill shall be placed in loose layers not exceeding 6 inches in depth under and around the pipe, and not exceeding 8 inches over the pipe. Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers to the required density, approved by the Engineer, until the trench is completely filled and brought to the proper elevation. Backfilling shall be done in a manner to avoid injurious top or side pressures on the pipe.

In embankments and for other areas outside of pavements, the backfill shall be compacted to the density required for embankments in unpaved areas of 90% of maximum density. Under paved areas, the subgrade and any backfill shall be compacted to the density required for embankments for paved areas of 95% of maximum density.

b. Granular Material. When granular backfill is required, its placement in the trench and about the pipe shall be as shown on the plans. Special care shall be taken in placing the backfill. The granular backfill shall not contain a damaging amount of foreign matter, nor shall earth from the sides of the trench or from the windrow be allowed to filter into the backfill. When required by the Engineer, a template shall be used to properly place and keep separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches (150 mm) in depth and compacted by hand and pneumatic tampers to the requirements as given for earth backfill. Backfilling shall be done in a manner to avoid injurious top or side pressure on the pipe. The granular backfill shall be made to the elevation of the trench, as shown on the plans.

When perforated pipe is specified, underdrain bedding material shall be placed along the full length of the pipe. The position of the bedding shall be as shown on the plans. The original materials excavated from the trench shall be disposed of off site by the Contractor and replaced with materials meeting the requirements of section 705-2.4.

When bedding is to be placed in paved or adjacent areas prior to the completion of pavement grading or subgrade operations, the backfill material shall be placed immediately after laying the pipe. The depth of this bedding shall be not less than 12 inches, measured from the top of the underdrain. During subsequent construction operations, this minimum bedding of 12 inches of depth shall not be disturbed until such time as the underdrains are to be completed. When the underdrains are to be completed, the unsuitable material shall be removed until the bedding is exposed. That part of the bedding that contains objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any such unsuitable material shall be borne by the Contractor.

Whenever a granular subbase blanket course is to be used under pavements which extends several feet beyond the edge of paving to the outside edge of the underdrain trench, the bedding material over the underdrains shall be placed in the trench up to an elevation of 2 inches above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material that remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain bedding material for the full width of the underdrain trench.

c. Deflection Testing. The Engineer may at any time, not withstanding previous material acceptance, reject or require re-installation of pipe that exceeds 5 percent deflection when measured in accordance with ASTM D 2321, including Appendices.

705-3.6 CONNECTIONS. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made so that a smooth uniform flow line will be obtained throughout the drainage system. Core drilled holes two sizes larger than pipe to be installed shall be drilled into structures in order to allow for a proper mortar joint.

705-3.7 CLEANING AND RESTORATION OF SITE. After the under drain pipe has been placed, backfilled and compacted, the Contractor shall remove all surplus materials from the site to an off site location and restore all disturbed areas to their original condition.

METHOD OF MEASUREMENT

705-4.1 RUNWAY EDGE DRAIN SYSTEM. The edge drain system to be paid for shall be for the complete and functional system in place, completed, and approved. All pipe, fittings, backfill material, bedding material, excavation, backfill, protection, geotextile fabric, pipe, fittings, concrete block below ground fittings, excavation, backfill, reinforcing steel, dowel bars connections to existing structures shall be included in the cost of the underdrain pipe system.

BASIS OF PAYMENT

705-5.1 RUNWAY EDGE DRAIN SYSTEM. Payment will be made at the contract unit price per lump for of the installation of the fully functional Runway Edge Drain System. This price shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item D-705-5.1 Runway Edge Drain System– per lump sum

CONTRACTOR QUALITY CONTROL

705-6.1 The Contractor shall be responsible for developing and implementing a Contractor Quality Control Program including inspection and testing to assure compliance with the requirements of this section in accordance with the General Provisions Section 100.

MATERIAL REQUIREMENTS

ASTM C 136	Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C 144	Aggregate for Masonry Mortar
ASTM C 150	Portland Cement
ASTM C 361	Reinforced Concrete Low-Head Pressure Pipe
ASTM D 2321	Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM D 2564	Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D 3785	Woven Necktie and Scarf Fabrics
ASTM D 4355	Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
ASTM D 4491	Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Trapezoid Tearing Strength of Geotextiles
ASTM D 4632	Grab Breaking Load and Elongation of Geotextiles
ASTM D 4751	Determining the Apparent Opening Size of a Geotextile
ASTM D 4833	Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4886	Abrasion Resistance of Geotextiles (Sand Paper/Sliding Block Method)
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Pipe
ASTM F 758	Smooth-Wall Poly (Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F 794	Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
ASTM F 949	Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
AASHTO M 252	Corrugated Polyethylene Drainage Pipe
AASHTO M 288-99	Geotextile Specification for Highway Applications
AASHTO M 294M	Corrugated Polyethylene Pipe, 300 to 1200mm Diameter

AASHTO M 304	Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO	Standard Specifications for Highway Bridges

END OF ITEM D-705

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ITEM D-751 MANHOLES, CATCH BASINS, INLETS AND INSPECTION HOLES

DESCRIPTION

751-1.1 This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.

MATERIALS

751-2.1 BRICK. The brick shall conform to the requirements of ASTM C 32, Grade SM.

751-2.2 MORTAR. Mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.

751-2.3 CONCRETE. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

751-2.4 PRECAST CONCRETE PIPE MANHOLE RINGS. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C 478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 in (90 cm) nor more than 48 in (120 cm).

751-2.5 CORRUGATED METAL. Corrugated metal shall conform to the requirements of AASHTO M 36.

751-2.6 FRAMES, COVERS, AND GRATES. The castings shall conform to one of the following requirements:

a.	ASTM A 48, Class 30B and 35B	Gray iron castings
b.	ASTM A 47	Malleable iron castings
c.	ASTM A 27	Steel castings
d.	ASTM A 283, Grade D	Structural steel for grates and frames
e.	ASTM A 536	Ductile iron castings
f.	ASTM A 897	Austempered ductile iron castings

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate 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 A 123.

751-2.7 STEPS. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

CONSTRUCTION METHODS

751-3.1 UNCLASSIFIED EXCAVATION.

a. The Contractor shall do all 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. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or 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 or crevices shall be cleaned out and grouted. All loose and 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, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. Unless otherwise provided, bracing, sheathing, or 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.

e. After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

751-3.2 CONCRETE STRUCTURES. Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. The construction 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 poured.

All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward the outlet.

751-3.3 PRECAST CONCRETE PIPE STRUCTURES. Precast concrete pipe structures shall be constructed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the plans. All precast concrete pipe sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be cemented with mortar. The top of the upper precast concrete pipe member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal steps that are embedded or built into the side walls shall be aligned and placed at vertical intervals of 12 in (300 mm). When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.4 INLET AND OUTLET PIPES. Inlet and outlet pipes shall extend through the walls of the structures for a sufficient distance beyond the outside surface to allow for connections but shall be cut off flush with the wall on the inside surface, unless otherwise directed. For concrete or brick structures, the mortar shall be placed around these pipes so as to form a tight, neat connection.

751-3.5 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.

When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed and approved by the Engineer. All units shall set firm and secure.

After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for 7 days, then the grates or covers shall be placed and fastened down.

751-3.6 INSTALLATION OF STEPS. The steps shall be installed as indicated on the plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is poured. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least 7 days. After this period has elapsed, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete pipe structures, they shall be cast into the sides of the pipe at the time the pipe sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 in (300 mm).

In lieu of steps, prefabricated ladders may be installed. In the case of brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. In the case of metal structures, the ladder shall be secured by welding the top support and grouting the bottom support into drilled holes in the foundation or as directed.

751-3.7 BACKFILLING.

a. After a structure has been completed, the area around it shall be filled with approved material, in horizontal layers not to exceed 8 in (200 mm) in loose depth, and compacted to the density required 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.

b. Backfilling 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 the concrete has been in place 7 days, or 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.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered on obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.10 CLEANING AND RESTORATION OF SITE. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

751-4.1 Manholes, catch basins, inlets, and inspection holes shall be measured by the unit.

BASIS OF PAYMENT

751-5.1 The accepted quantities of manholes, catch basins, inlets, and inspection holes will be paid for at the contract unit price per each in place when completed. 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 such specials and connections to pipes 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.

Payment will be made under:

Item D-751-5.1	Manholes-per each
Item D-751-5.2	Catch Basins-per each
Item D-751-5.3	Adjust Existing Catch Basin to Grade – per each

MATERIAL REQUIREMENT

ASTM A 27	Steel Castings, Carbon, for General Application
ASTM A 47	Ferritic Malleable Iron Castings
ASTM A 48	Gray Iron Castings
ASTM A 123	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A 536	Ductile Iron Castings
ASTM A 897	Austempered Ductile Iron Castings
ASTM C 32	Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C 144	Aggregate for Masonry Mortar
ASTM C 150	Portland Cement
ASTM C 478	Precast Reinforced Concrete Manhole Sections
AASHTO M 36	Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains

END OF ITEM D-751

ITEM T-901 SEEDING

DESCRIPTION

901-1.1 This item shall consist of soil preparation, seeding and fertilizing or liming the areas shown on the plans or as directed by the Engineer 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 Fed. Spec. JJJ-S-181.

Seed shall be furnished separately or in mixtures in standard containers 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 Engineer 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 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.

Seeds shall be applied as follows:

Seed	Minimum Seed Purity (Percent)	Minimum Germination (Percent)	Rate of Application lb./acre (or lb./1,000 S.F.)
Bermuda and Giant Bermuda grass (hulled), Cynodon Dactylon	95	90	1.5 lb/1,000 SF
Annual Rye Grass (Added to mix between October 1 and March15)	95	90	20 lb/1,000 SF
70/30 Wood/Cellulose Blend fiber mulch			2,000 lb/acre
Fertilizer	W		400 lb/acre
Water			Per manufacturer's instructions
Binder			Per manufacturer's instructions

Seeding shall be performed during the period between **[ ]** and **[ ]** inclusive, unless otherwise approved by the Engineer.

901-2.2 LIME. Lime shall be ground limestone containing not less than 85% of total carbonates, and shall be ground to such fineness that 90% will pass through a No. 20 mesh sieve and 50% will pass through a No. 100 mesh sieve. Coarser material will be acceptable, providing the rates of application are increased to provide not less than the minimum quantities and depth specified in the special provisions on the basis of the two sieve requirements above. Dolomitic lime or a high magnesium lime shall contain at least 10% of magnesium oxide. Lime shall be applied at the rate of the rates as recommended by the **soil test analysis that is to be conducted by the Contractor** prior to construction. All liming materials shall conform to the requirements of ASTM C 602.

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 herein, and shall meet the requirements of Fed. Spec. A-A-1909 and 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 slow release commercial fertilizer and shall be spread at the rate as recommended by the **soil test analysis that is conducted by the Contractor**.

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 Engineer before being placed.

901-2.5 HYDRO MULCHING. Hydro mulching - 100% virgin wood cellulose fiber mulch shall be;

- Free of growth or germination inhibiting ingredients.
- Specially manufactured for use in hydraulic seeding and mulching equipment.
- Minimum organic matter content of 95%.
- Minimum moisture content of 12%.
- Water absorption potential of 800 -900% for wood cellulose fiber mulch.
- Quantity and rate shall be per the manufacturer's recommendation for use as a metering agent to apply seed uniformly over designated area.

901-2.6 Contractor shall apply hydro-mulch with hydro-seeding in all locations as designated on the plans or by the engineer.

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 in (50 mm) 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. This may 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 in (125 mm) as a result of grading operations and, if immediately prior to seeding, the top 3 in (75 mm) of soil is loose, friable, reasonably free from large clods, rocks, large roots, or other undesirable matter, and if shaped to the required grade.

However, 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 in (125 mm). Clods shall be broken and the top 3 in (75 mm) 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 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 (190 liters) 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 (380 liters) per minute at a pressure of 100 lb / sq in (690 kPa). 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 5/8 in (15 mm) 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 ft (6 to 30 m). 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 ft (15 m) 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 (100 kg) of lime shall be added to and mixed with each 100 gallons (380 liters) of water. Seed and fertilizer shall be mixed together in the relative proportions specified, but not more than a total of 220 pounds (100 kg) of these combined solids shall be added to and mixed with each 100 gallons (380 liters) 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. Brackish water shall not be used at any time. The Contractor shall identify to the Engineer all sources of water at least 2 weeks prior to use. The Engineer may take samples of the water at the source or from the tank at any time and have a laboratory test the samples for chemical and saline content. The Contractor shall not use any water from any source that is disapproved by the Engineer following such tests.

All mixtures shall be constantly agitated from the time they are mixed until they are finally applied to the seedbed. All such mixtures shall be used within 2 hours from the time they were mixed or they shall be wasted and disposed of at locations acceptable to the Engineer.

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 in (8 cm), 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 insure 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 Engineer, seed and fertilizer applied by the spray method need not be raked into the soil or rolled. However, on surfaces on which mulch is not to be used, the raking and rolling operations will be required after the soil has dried.

901-3.3 MAINTENANCE OF SEEDED AREAS. The Contractor shall protect seeded areas against traffic or other use by warning signs or barricades, as approved by the Engineer. Surfaces gullied or otherwise damaged following seeding shall be repaired by regrading and reseeding as directed. The Contractor shall mow, water as directed, and otherwise maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work. **The Contractor shall coordinate the timing of watering the seeded area with Airport Operations. At a minimum the Contractor shall water the seeded area nightly (after midnight) for two months after the seed has been placed. If an acceptable stand has not be produced the Contractor shall continue to water the seeded area twice a week (nightly after midnight) for an additional month. The contractor shall coordinate mowing, fertilizing and watering of the seeded areas with Airport Operations until an acceptable stand of grass has been achieved.**

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 Engineer. A grass stand shall be considered adequate when bare spots are one square foot or less, randomly dispersed, and do not exceed 3 percent of the area seeded. If at the time when the contract has been otherwise completed it is not possible to make an adequate determination of the color, density, and uniformity of such stand of grass, payment for the unaccepted portions of the areas seeded out of season will be withheld until such time as these requirements have been met.

METHOD OF MEASUREMENT

901-4.1 The quantity of Hydro-Mulch 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:

Item T-901 5.1 Hydro-Mulch Seeding – per acre

MATERIAL REQUIREMENTS

ASTM C 602	Agricultural Liming Materials
ASTM D 977	Emulsified Asphalt
FED SPEC A-A-1909	Fertilizer

END OF ITEM T-901

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ITEM T-904 SODDING

DESCRIPTION

904-1.1 This item shall consist of furnishing, hauling, and placing approved live sod on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

904-2.1 SOD. Sod furnished by the Contractor shall have a good cover of living or growing grass. This shall be interpreted to include grass that is seasonally dormant during the cold or dry seasons and capable of renewing growth after the dormant period. All sod shall be obtained from areas where the soil is reasonably fertile and contains a high percentage of loamy topsoil. Sod shall be cut or stripped from living, thickly matted turf relatively free of weeds or other undesirable foreign plants, large stones, roots, or other materials that might be detrimental to the development of the sod or to future maintenance. At least 70% of the plants in the cut sod shall be composed of the species stated in the special provisions, and any vegetation more than 6 in (150 mm) in height shall be mowed to a height of 3 in (75 mm) or less before sod is lifted. Sod, including the soil containing the roots and the plant growth showing above, shall be cut uniformly to a thickness not less than that stated in the special provisions.

904-2.2 LIME. Lime shall conform to the requirements of 901-2.2.

904-2.3 FERTILIZER. Fertilizer shall conform to the requirements of 901-2.3.

904-2.4 WATER. The water shall be sufficiently free from oil, acid, alkali, salt, or other harmful materials that would inhibit the growth of grass. It shall be subject to the approval of the Engineer prior to use.

904-2.5 SOIL FOR REPAIRS. The soil for fill and topsoiling of areas to be repaired shall conform to the requirements of 901-2.4.

CONSTRUCTION METHODS

904-3.1 GENERAL. Areas to be solid, strip, or spot sodded shall be shown on the plans. Areas requiring special ground surface preparation such as tilling and those areas in a satisfactory condition that are to remain undisturbed shall also be shown on the plans.

Suitable equipment necessary for proper preparation of the ground surface and for the handling and placing of all required materials shall be on hand, in good condition, and shall be approved by the Engineer before the various operations are started. The Contractor shall demonstrate to the Engineer before starting the various operations that the application of required materials will be made at the specified rates.

904-3.2 PREPARING THE GROUND SURFACE. After grading of areas has been completed and before applying fertilizer and limestone, areas to be sodded shall be raked or otherwise cleared of stones larger than 2 in (50 mm) in any diameter, sticks, stumps, and other debris which might interfere with sodding, growth of grasses, or subsequent maintenance of grass-covered areas. If any damage by erosion or other causes occurs after grading of areas and before beginning the application of fertilizer and ground limestone, the Contractor shall repair such damage. This may include filling gullies, smoothing irregularities, and repairing other incidental damage.

904-3.3 APPLYING FERTILIZER AND GROUND LIMESTONE. Following ground surface preparation, fertilizer shall be uniformly spread at a rate which will provide not less than the minimum quantity of each fertilizer ingredient, as stated in the special provisions. If use of ground limestone is required, it shall then be spread at a rate that will provide not less than the minimum quantity stated in the special provisions. These materials shall be incorporated into the soil to a depth of not less than 2 in (50 mm) by discing, raking, or other methods acceptable to the Engineer. Any stones larger than 2 in (50 mm) in any diameter, large clods, roots, and other Jitter brought to the surface by this operation shall be removed.

904-3.4 OBTAINING AND DELIVERING SOD. After inspection and approval of the source of sod by the Engineer, the sod shall be cut with approved sod cutters to such a thickness that after it has been transported and placed on the prepared bed, but before it has been compacted, it shall have a uniform thickness of not less than 2 in (50 mm). Sod sections or strips shall be cut in uniform widths, not less than 10 in (250 mm), and in lengths of not less than 18 in (45 cm), but of such length as may be readily lifted without breaking, tearing, or loss of soil. Where strips are required, the sod must be rolled without damage with the grass folded inside. The Contractor may be required to mow high grass before cutting sod.

The sod shall be transplanted within 24 hours from the time it is stripped, unless circumstances beyond the Contractor's control make storing necessary. In such cases, sod shall be stacked, kept moist, and protected from exposure to the air and sun and shall be kept from freezing. Sod shall be cut and moved only when the soil moisture conditions are such that favorable results can be expected. Where the soil is too dry, permission to cut sod may be granted only after it has been watered sufficiently to moisten the soil to the depth the sod is to be cut.

904-3.5 LAYING SOD. Frozen sod shall not be used and sod shall not be placed upon frozen soil. Sod may be transplanted during periods of drought with the approval of the Engineer, provided the sod bed is watered to moisten the soil to a depth of at least 4 in (100 mm) immediately prior to laying the sod.

The sod shall be moist and shall be placed on a moist earth bed. Pitch forks shall not be used to handle sod, and dumping from vehicles shall not be permitted. The sod shall be carefully placed by hand, edge to edge and with staggered joints, in rows at right angles to the slopes, commencing at the base of the area to be sodded and working upward. The sod shall immediately be pressed firmly into contact with the sod bed by tamping or rolling with approved equipment to provide a true and even surface, and insure knitting without displacement of the sod or deformation of the surfaces of sodded areas. Where the sod may be displaced during sodding operations, the workmen when replacing it shall work from ladders or treaded planks to prevent further displacement. Screened soil of good quality shall be used to fill all cracks between sods.

The quantity of the fill soil shall not cause smothering of the grass. Where the grades are such that the flow of water will be from paved surfaces across sodded areas, the surface of the soil in the sod after compaction shall be set approximately 1 1/2 in below the pavement edge. Where the flow will be over the sodded areas and onto the paved surfaces around manholes and inlets, the surface of the soil in the sod after compaction shall be placed flush with pavement edges.

On all areas to be sodded, the sod shall be pegged in-place with wooden pegs not less than 12 in (300 mm) in length and have a cross-sectional area of not less than 3/4 sq. in (18 so mm). Place one peg at each short end of each strip that's laid. When sod is placed next to an asphalt shoulder the first three rows of sod shall be pegged every three (3) feet along its length. Pegs shall be driven flush with the surface of the sod.

904-3.6 WATERING. Adequate water and watering equipment must be on hand before sodding begins, and sod shall be kept moist until it has become established and its continued growth assured. In all cases, watering shall be done in a manner that will avoid erosion from the application of excessive quantities and will avoid damage to the finished surface. **The Contractor shall coordinate the timing of watering the sodded area with Airport Operations. At a minimum the Contractor shall water the sodded area nightly (after midnight) for two months after the sod has been placed. If an established turf has not been produced the Contractor shall continue to water the area twice a week (nightly after midnight) for an additional month. The contractor shall coordinate mowing, fertilizing and watering of the sodded areas with Airport Operations until an acceptable turf has been established.**

904-3.7 ESTABLISHING TURF.

a. General. The Contractor shall provide general care for the sodded areas as soon as the sod has been laid and shall continue until final inspection and acceptance of the work.

b. Protection. All sodded areas shall be protected against traffic or other use by warning signs or barricades approved by the Engineer.

c. Overseeding. If the sod is installed/laid between October 1st to May 1st, the contractor shall overseed the entire sodded area with a Perennial Ryegrass. This will be done to encourage and establish an acceptable turf. The overseeing will not be measured or paid for separately but will be incidental to providing and establishing a turfed surface.

d. Mowing. The Contractor shall mow the sodded areas with approved mowing equipment, depending upon climatic and growth conditions and the needs for mowing specific areas. In the event that weeds or other undesirable vegetation are permitted to grow to such an extent that, either cut or uncut, they threaten to smother the sodded species, they shall be mowed and the clippings raked and removed from the area.

e. Fertilizing. After the first mowing (of sod or seeded areas) the Contractor shall fertilize the turf with a an appropriate fertilizer based on the time of the year when the first mowing takes place.

904-3.8 REPAIRING. When the surface has become bullied or otherwise damaged during the period covered by this contract, the affected areas shall be repaired to re-establish the grade and the condition of the soil, as directed by the Engineer, and shall then be sodded as specified in 904-3.5.

METHOD OF MEASUREMENT

904-4.1 This item shall be measured on the basis of the area in square yards of the surface covered with sod and accepted.

BASIS OF PAYMENT

904-5.1 This item will be paid for on the basis of the contract unit price per square yard for sodding, which price shall be full compensation for all labor, equipment, material, staking, and incidentals necessary to satisfactorily complete the items as specified.

Payment will be made under:

Item T-904-5.1 Sodding - per square yard.

END OF ITEM T-904

ITEM T-905 TOPSOILING

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

905-2.1 TOPSOIL. Topsoil shall be the surface layer of soil with no admixture of refuse or any material toxic to plant growth, and it shall be reasonably free from subsoil and stumps, roots, brush, stones (2 in or more in diameter), and clay lumps or similar objects. Brush and other vegetation that will not be incorporated with the soil during handling operations shall be cut and removed. Ordinary sods and herbaceous growth such as grass and weeds are not to be removed but shall be thoroughly broken up and intermixed with the soil during handling operations. The topsoil or soil mixture, unless otherwise specified or approved, shall have a pH range of approximately 5.5 pH to 7.6 pH, when tested in accordance with the methods of testing of the association of official agricultural chemists in effect on the date of invitation of bids. The organic content shall be not less than 3% nor more than 20% as determined by the wet-combustion method (chromic acid reduction). There shall be not less than 20% nor more than 80% of the material passing the 200 mesh (0.075 mm) sieve as determined by the wash test in accordance with ASTM C 117.

Natural topsoil may be amended by the Contractor with approved materials and methods to meet the above specifications.

905-2.2 INSPECTION AND TESTS. Within 10 days following acceptance of the bid, the Engineer shall be notified of the source of topsoil to be furnished by the Contractor. The topsoil shall be inspected to determine if the selected soil meets the requirements specified and to determine the depth to which stripping will be permitted. At this time, the Contractor may be required to take representative soil samples from several locations within the area under consideration and to the proposed stripping depths, for testing purposes as specified in 905-2.1.

CONSTRUCTION METHODS

905-3.1 GENERAL. Areas to be topsoiled shall be shown on the plans. If topsoil is available on the site, the location of the stockpiles or areas to be stripped of topsoil and the stripping depths shall be shown on the plans.

Suitable equipment necessary for proper preparation and treatment of the ground surface, stripping of topsoil, and for the handling and placing of all required materials shall be on hand, in good condition, and approved by the Engineer before the various operations are started.

905-3.2 PREPARING THE GROUND SURFACE. Immediately prior to dumping and spreading the topsoil on any area, the surface shall be loosened by discs or spike-tooth harrows, or by other means approved by the Engineer, to a minimum depth of 2 in (50 mm) to facilitate bonding of the topsoil to the covered subgrade soil. The surface of the area to be topsoiled shall be cleared of all stones larger than 2 in (50 mm) in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting. Limited areas, as shown on the plans, which are too compact to respond to these operations shall receive special scarification.

Grades on the area to be topsoiled, which have been established by others as shown on the plans, shall be maintained in a true and even condition. Where grades have not been established, the areas shall be smooth-graded and the surface left at the prescribed grades in an even and properly compacted condition to prevent, insofar as practical, the formation of low places or pockets where water will stand.

905-3.3 OBTAINING TOPSOIL. Prior to the stripping of topsoil from designated areas, any vegetation, briars, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, shall be removed using methods approved by the Engineer. Heavy sod or other cover, which cannot be incorporated into the topsoil by discing or other means shall be removed.

When suitable topsoil is available on the site, the Contractor shall remove this material from the designated areas and to the depth as directed by the Engineer. The topsoil shall be spread on areas already tilled and smooth-graded, or stockpiled in areas approved by the Engineer. Any topsoil stockpiled by the Contractor shall be rehandled and placed without additional compensation. Any topsoil that has been stockpiled on the site by others, and is required for topsoiling purposes, shall be removed and placed by the Contractor. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, the Contractor shall locate and obtain the supply, subject to the approval of the Engineer. The Contractor shall notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. The Contractor shall remove the topsoil from approved areas and to the depth as directed. The topsoil shall be hauled to the site of the work and placed for spreading, or spread as required. Any topsoil hauled to the site of the work and stockpiled shall be rehandled and placed without additional compensation.

905-3.4 PLACING TOPSOIL. The topsoil shall be evenly spread on the prepared areas to a uniform depth of 2 in (50 mm) after compaction, unless otherwise shown on the plans or stated in the special provisions. Spreading shall not be done when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to the work. Spreading shall be carried on so that turfing operations can proceed with a minimum of soil preparation or tilling.

After spreading, any large, stiff clods and hard lumps shall be broken with a pulverizer or by other effective means, and all stones or rocks (2 in (50 mm) or more in diameter), roots, litter, or any foreign matter shall be raked up and disposed of by the Contractor. after spreading is completed, the topsoil shall be satisfactorily compacted by rolling with a cultipacker or by other means approved by the Engineer. The compacted topsoil surface shall conform to the required lines, grades, and cross sections. Any topsoil or other dirt falling upon pavements as a result of hauling or handling of topsoil shall be promptly removed.

METHOD OF MEASUREMENT

905-4.1 Topsoil obtained on the site shall be measured by the number of cubic yards of topsoil measured in its original position and stripped or excavated. Topsoil stockpiled by others and removed for topsoiling by the Contractor shall be measured by the number of cubic yards of topsoil measured in the stockpile. Topsoil shall be measured by volume in cubic yards computed by the method of end areas.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per cubic yard for topsoiling (obtained on the site). This price shall be full compensation for furnishing all materials and for all preparation, placing, and spreading of the materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item T-905-5.1 Topsoiling -per cubic yard.

TESTING MATERIALS

ASTM C 117 Materials Finer than 75 pm (No. 200) Sieve in Mineral Aggregates by Washing

END OF ITEM T-905

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PART II – TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

ELECTRICAL SPECIFICATIONS

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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 following:

a. The demolition/removal of portions of the existing airfield lighting systems.

b. The modification of the ALCS functions including changes to the ATCT touch screen, software adjustments and calibrations as required for accommodating the modified geometry and field circuits. The ALCS modifications shall be tested, operationally completed and accepted by the owner by the end of stage 1. Refer to 060 SUPPLEMENTAL CONDITIONS for Construction Staging and Liquidated Damages.

Installation shall be in accordance with Specifications FAA-C-1217 and FAA-C-1391, except as specified herein. Perform all work not included in the FAA Specifications in accordance with the National Electrical Code, applicable local and San Antonio International Airport (SAT) standards and regulations.

100-1.2 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions, apply to work specified in this Item.

a. See 060 SUPPLEMENTAL CONDITIONS for liquidated damages and the sequence of construction.

b. See Item P-151, *Clearing and Grubbing* for specifics of demolition and adjustment of existing facilities.

c. Conflicts between Drawing and Specifications (Contract Documents) and between Contract Documents and references within the Contract Documents: 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 (Aviation Department, City, County, etc.), local Utility companies and local, County or State governing bodies.

100-1.3 TEMPORARY LIGHTING AND CIRCUITS.

a. Contractor shall coordinate with Operations and Maintenance 1 hours before the end of each daylight work shift to verify that all airfield lighting circuits are operational. Contractor shall provide all labor and material for this work.

b. Contractor shall provide and maintain on hand sufficient equipment required to provide temporary lighting and circuit extensions. This includes, but is not limited to the following:

(1) Twenty Five (25) L-823 splice kits,
(2) Twenty Five (25) 6.6A isolation transformers of various capacities,
(3) Two Hundred Fifty (250) Lineal Feet of 2” PVC conduit for temporary above grade connections,
(4) Five Hundred (500) Lineal Feet L-824, #6 5kV type ‘C’ cable for temporary connections.

These items will not be available from Airport Maintenance.

The intent of maintaining the foregoing material is to be able to provide expeditious repairs during the phases of the project requiring temporary circuitry or the interception/interruption of existing circuitry. As coordinated with the Owner and Engineer, and as the project winds down and the need for repairs decreases, it is expected that the Contractor may draw down this material for use in permanent installations.

100-1.4 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	The latest adopted edition of the National Electrical Code
FAA-STD-019	*Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities*
FAA-C-1217	*Electrical Work, Interior*
FAA-C-1391	*Installation and Splicing of Underground Cables*
Utility Company Rules and Regulations	CPS Energy
Local Governing Bodies' Codes and Regulations	City of San Antonio Aviation Department

100-1.5 SHOP DRAWINGS AND MATERIAL LISTS. Prior to the installation of any material and equipment and within thirty (30) days of contract award, the Contractor shall submit to the Owner for approval eight (8) 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.

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.

Unless otherwise coordinated with the Engineer, the submittal shall be complete and made in one submission in booklet form with hard-bound cover. Partial submissions will not be reviewed or considered.

Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

Provide submittals for the following equipment under these Items:

a. ALCS Modifications.
b. 600 V power cables.
c. 600 V rated multi-pair or multi-conductor signal and control cables.

100-1.6 AIRFIELD LIGHTING SYSTEM SWITCHOVER BETWEEN CONSTRUCTION STAGES. At each stage switchover and prior to the end of every work shift, the Contractor shall test and operate the effected airfield lighting and miscellaneous power circuits early enough, prior to their need, as required to verify correct operation to Airport Operations.

EQUIPMENT AND MATERIALS

100-2.1 EQUIPMENT. Conduits, conduit fittings, conductors, connectors, boxes, wiring devices, panelboards, and circuit breakers shall meet requirements of Specification FAA-C-1217.

100-2.2 CONDUIT, EXTERIOR. Conduits in concrete slabs, in block walls or exterior exposed shall be rigid galvanized steel (RGS). Conduits run on the exterior of the building above or below the grade for the earth grounding system shall be rigid zinc-coated steel. Radius of bends in RGS shall be minimum 12 nominal pipe diameters. Rigid galvanized steel conduit run in concrete or below slab on grade, or in the ground, shall be field wrapped or shall have factory-applied coating as required in Specification FAA-C-1217. Field-made joints, fittings, abrasions and holidays shall be coated or wrapped with material equal to the original coating or wrapping.

100-2.3 CONDUIT, UNDERGROUND. Conduits run underground are specified in Item L-110, *Airport Underground Electrical Duct Banks and Conduits* of these specifications.

100-2.4 600 VOLT WIRE. All wire shall have copper conductors. Size shall be American Wire Gauge (AWG) with size for power circuit as shown on the project drawings. All Power wire shall be stranded. Insulation shall be Type THWN-2 (above ground) or XHHW (below ground) and shall be continuous and color coded as follows:

		120/208V	277/480V
Line 1 or	Phase "A"	Black	Brown
Line 2 or	Phase "B"	Red	Orange
	Phase "C"	Blue	Yellow
	Neutral White		Gray
	Ground	See Item 100-3.5	
	Control	Black with numbered adhesive Markers on both ends	

All wire shall be continuous; no splices will be permitted. All wire shall be drawn into conduit with adequate lubricating compound to prevent damage to insulation. Pull tension shall not exceed manufacturer's recommendation.

100-2.5 CONDUIT FITTINGS. Each conduit and nipple entrance to junction boxes, panelboards, disconnect switches, duct, raceway, equipment cabinets, 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 openings where conduits enter junction boxes, other enclosures and shelters shall be sealed weathertight. The

conduit shall be capped, if left empty, or sealed with Ducseal, or equal, around the conductors for exterior conduits.

100-2.6 CONCRETE-ENCASED DUCT. Concrete-encased PVC duct shall be provided with a 3-inch minimum encasement with spacing between conduits as detailed on the plans. Concrete shall be colored red or shall be provided with a vinyl warning tape as detailed on the plans and specified in Item L-110, *Airport Underground Electrical Duct Banks and Conduits*.

100-2.7 CONCRETE DUCT MARKERS. Markers shall be as specified in Item L-110, *Airport Underground Electrical Duct Banks and Conduits* and as detailed on drawings.

100-2.8 CONCRETE HANDHOLES AND JUNCTION STRUCTURES. Handholes and junction structures shall be as specified in Item L-115, *Electrical Handholes and Junction Structures* and as detailed on drawings.

100-2.9 LIGHT BASES AND TRANSFORMER HOUSING. Bases and covers shall be specified in item L-867/868, *Light Base and Transformer Housing* and as detailed on drawings.

100-2.10 OTHER ELECTRICAL EQUIPMENT. Cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers (IEEE) or the National Electrical Manufacturers Association (NEMA). When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first-grade product. This equipment shall be supplied in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the specification and plans.

CONSTRUCTION METHODS

100-3.1 EXISTING UTILITIES. Prior to any excavation or trenching, provide utility locator and verify any existing cables and utilities which will be crossed by the trench. 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 no additional cost to the Owner. Existing utilities to be abandoned or removed at the point of crossing as shown on the drawings.

100-3.2 DEMOLITION AND SALVAGE.

a. Demolition. Removal of indicated portions of the airfield lighting system serving Runway 12R-30L, Taxiway ‘G’ and associated taxiways as follows:

(1) Remove indicated power and signal cables from conduits and ducts.

(2) Demolish indicated conduits, ducts, handholes and concrete light and sign bases per the requirements of Item P-151, *Clearing and Grubbing*. Elements covered shall include the intent, but not be limited to the specific elements, of the following:

(a) Underground conduits and duct banks, both concrete encased and direct earth buried.

(b) Underground electrical concrete structures including manholes and handholes of varying sizes.

(c) Sign and light concrete encased bases and miscellaneous concrete footings.

(3) Remove demolished material from site and dispose of according to local regulations.

(4) Provide backfill meeting the requirements of P-152, *Excavation and Embankment*. Unless otherwise required for general Civil excavation and embankment, replacement backfill and paving repair shall be incidental to the demolition item.

b. Salvage. Removal and salvage of airfield electrical elements is included under this Item shall include the intent, but not be limited to the specific elements, of the following:

(1) Light fixtures and isolation transformers.

(2) Sign panels.

(3) Salvageable material and equipment slated for reinstallation including indicated signs, panels and lights shall be stored securely for reinstallation as noted on drawings.

(4) Salvageable material and equipment not slated for reinstallation, and deemed salvageable by the SAT shall be removed and salvaged to the Airport as directed by appropriate Airport personnel.

(5) All lights and signs deemed non-salvageable by the Airport and isolation transformers (which are not slated for reinstallation) shall become the property of the Contractor and shall be removed from the site.

100-3.3 CIRCUIT BREAKERS. Panelboard-mounted circuit breakers and other similar items shall be furnished and installed at the locations shown in the plans.

100-3.4 CONDUCTORS. Installation of underground 5 kV conductors is specified in Item L-108 of these specifications.

100-3.5 GROUNDING. All metal support structures and metal enclosures shall be grounded in accordance with the requirements of the Specifications FAA-C-1217, FAA-C-1391, and FAA-STD-019, and as indicated on the drawings.

100-3.6 GROUND RODS. Grounding rods shall be 3/4-inch diameter by 10 feet long copper-jacketed steel. Grounding connections shall be by the exothermic weld process, Cadweld or equal. Extruded, drawn or stamped-type ground clamps will not be acceptable unless otherwise noted. The resistance to ground shall not exceed 25 ohms.

100-3.7 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 250-95 of the National Electrical Code and with FAA-STD-019. 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	COLOR OF INSULATION
Grounding Electrode Conductor	Bare - No Insulation
Equipment Grounding Conductor	Green (safety)
*Multipoint Ground (Frame)	Green with bright orange tracer
*Signal Ground	Green with bright yellow tracer

*Where these cables are concealed and not color coded, an exposed portion of the cable and each end of the cable for a minimum length of 2 feet shall be color coded with green tape overlaid with a bright orange or yellow to form a tracer. Where routed through raceways or wireways, the color coding shall be such that by removing or opening any one cover, the coding will be visible. Where conductors are routed through cable trays, color coding shall be accomplished at intervals not exceeding 3 feet.

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.

100-3.8 IDENTIFICATION. Handhole, manhole, fixture and sign identification shall be as detailed on the drawings and as indicated in the associated "L" series Items. Cable tagging and markers shall be identified as per FAA-C-1391, Sections 3.5.1 and 2.

100-3.9 NOTIFICATION OF TESTING. The Contractor shall notify the project Resident Engineer (RE) and the owner (SAT) a minimum of 48 hours in advance of system, or partial system, testing, including but not limited to, installed cable megger testing, operational testing of any modified lighting circuit and fixture and signs photometric testing.

100-3.10 TESTING AND SUBMITTALS. Equipment and materials list and shop drawings shall be submitted as per FAA-C-1217, Section 5.1. Testing shall be required and performed as per FAA-C-1217, Section 5.3 and FAA-C-1391, Section 4. 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 secure the services of an independent testing service to test the installed airfield lighting and miscellaneous power cables prior to the start of and at the completion of this project. The results of the testing shall be provided to the Owner and Construction Manager for review and acceptance. The Contractor shall be responsible for repairs or replacement of any cable found defective after installation.

The Contractor shall provide testing of the new, installed airfield lighting fixtures and new, installed signs per Table below.

Installation tests in addition to all tests contained in other L-Series Items shall be provided as follows:

Item	Test Required	Manufac-turer'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 to 2.0 times nominal system rated voltage 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 megohms (1 gigohm).	No
5 kV Rated Airfield Lighting and Power Cables (Installed in This Project)	Megger check at 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 required that the readings be greater than 100 megohms.	No
5 kV Rated Airfield Lighting and Power Cables (All Circuits Modified in This Project, Emanating from any Lighting Vault)	Megger check at 1000 volts prior to the start of and 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	Continuous-tape pull tension readings for each section of cable shall be provided to the Construction Manager for review.	No
Bases	All in-pavement lighting cans shall be fitted in accordance with FAA Advisory Circulars such that the base of the fitting, when installed, shall be level with the surrounding surface. Alignment jigs as supplied by Jaquith Industries, Inc. (or equal) shall be used to ensure the can is aligned in such a way that no portion of the can shall be above the level of the surrounding surface and the can is geometrically positioned such that when the fitting is installed, the light beam will be directed in accordance with the appropriate advisory circulars for that type of fitting and its location.	No

Item	Test Required	Manufac-turer's Rep. Present?
Airfield Light Fixture	Each light fixture will be tested prior to installation to ensure that lenses, where required, have been fitted, no signs of physical damage to the fittings exist and the lamps are working by connecting the fittings' electrical leads to a DC voltage source not exceeding 6 volts, such as a motorcycle battery. Any failures are to be reported to the Construction Manager. The fittings, when installed, shall be torqued to manufacturer's and FAA requirements and noted.	No

METHOD OF MEASUREMENT

100-4.1 ALCS MODIFICATIONS. Payment will be made at the contract Lump Sum price for the ALCS Modifications completed and accepted. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete this Item as accepted by the Owner.

100-4.2 WINDCONE RELOCATION. Payment will be made at the contract Lump Sum price for the windcone relocation, completed and accepted. This price shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete this Item as accepted by the Owner.

100-4.3 AIRFIELD ELECTRICAL SYSTEM DEMOLITION AND SALVAGE. Payment will be made at the contract Lump Sum price for the electrical demolition, removal and salvage 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 this Item as accepted by the Owner.

BASIS OF PAYMENT

100-5.1 ALCMS MODIFICATIONS. This Item consists of the modification of the ALCMS functions including changes to the ATCT touch screen, software adjustments and calibrations as required for accommodating the modified geometry and field circuits and shall include the following major elements:

a. Programming of the ALCMS shall include all new functions into the control scheme, to the satisfaction of the Engineer.

b. This work shall also include all supervision, labor, software, programming, materials, tools, equipment, cabling, conduit, wireways, the marking and labeling of equipment, the labeling or tagging of wires, the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed system to the satisfaction of the Engineer.

c. The existing ALCMS functions shall be modified as needed to accommodate the reconfiguring of the airfield lighting systems. This work will include, at least, graphics modifications (The

addition of Taxiway 'W' and reconfiguration of Taxiway "G" and "H" and recalibration of all CCRs for circuits modified under this Project.

d. The ALCMS modifications will be performed as required for each Alternate bid package – ALT 2, ALT. 3, ALT 4 & ALT 5. As each alternate bid opens and modifies the islands between Taxiway "G" and "H", the ALCS modification will be required to utilize the new pavement area. Each allowance shall include all expenses and incidentals required for each phase of the alternate bid packages.

e. The ALCMS modification shall be done by Liberty Airport System or approved equal as approved by the Owner.

f. Testing and connection of the ALCMS control devices, including conduit, control cabling and cable terminations shall be incidental to this item.

100-5.2 WINDCONE RELOCATION. This Item consists of the relocation of the windcone including salvage of the existing wind cone and pole, removal of the existing windcone concrete foundation, installation of a new windcone foundation, and re-installation of the existing windcone.

100-5.3 AIRFIELD ELECTRICAL SYSTEM DEMOLITION AND SALVAGE. This Item consists of the removal of indicated portions of the airfield lighting system serving, Runway 12R-30L, Taxiways 'G', 'H' and 'N', including, if deemed acceptable by San Antonio International Airport, the salvage to SAT, of selected light fixtures, signs, transformers and fixture base covers not already indicated to be salvaged for reinstallation. The removal of all conductors which are not to remain in service. Conduit, duct banks, fixture bases and concrete handholes are to be selectively demolished as part of the grading and excavation or abandoned in place.

Payment will be made under:

Item L-100-5.1 ALCMS Modifications (Allowance) – per Lump Sum

Item L-100-5.2 Windcone Relocation– per Lump Sum

Item L-100-5.3 Electrical Demolition – per Lump Sum

END OF ITEM L-100

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ITEM L-100a FIXTURE TESTING

DESCRIPTION

100a-1.1 GENERAL. This Item includes furnishing and installing all material, equipment and apparatus, and all labor, tools, services and equipment required for the following:

a. Photometric testing of airfield lighting system – Runway Edge – shall be performed by a firm with demonstrated capability for the field measurement of the photometric performance of airfield lighting fixtures. The firm shall have experience in evaluating the test results against FAA standards and manufacturers' performance criteria.

b. The firm shall demonstrate its capability by having performed similar work successfully at no less than ten (10) air carrier airports in the past five (5) years. Suggested contact for this service shall be as above, as follows or approved equal:

Lean Photometrics
Doran Lean
113 South 25th Street
Phoenix, AZ 85034
Phone: 620-244-1076
Fax: 480-948-9556 fax
Email: dlean@leanphotometrics.com

Navaid Lighting Associates, Inc.
David N. Rainey
141 Autumn Glenn Road
Saltillo, MS 38866
Phone: 662-869-8655
Fax: 662-869-0065
Email: info@navaidlighting.com

A list of equipment to be used for the electrical testing of the lights shall be submitted to the Engineer for approval. In addition, the Contractor's bid/proposal shall include the record of experience on similar projects with references for future contact.

100a-1.2 LIGHT FIXTURE TESTING REQUIREMENTS. The testing shall be performed on all of the new or relocated lights, which are indicated to be installed in this Project by the Contract Documents.

Photometric testing shall be performed at night with minimum interference with airport operations. Not more than 24 hours prior to starting the test, the Contractor shall clean and align all the light fixtures to assure that the system is ready for the photometric testing. Contractor shall also verify calibration of constant current regulator output using a true RMS ammeter prior to photometric testing.

The photometric test equipment shall have an array of sensors capable of taking simultaneous readings along the horizontal axis of the light output. (Ref. FAA Advisory Circular AC 150/5345-46 (latest version), Tables 1 and 2.) Photometric testing shall include the measurement at each light fixture of the light distribution along the horizontal axis. The software shall be capable of recording the data and analyzing that data to calculate:

a. The average photometric output of the main beam of the fixture,

b. The location of the maximum reading,

c. The location of the minimum reading,

d. The ratio of the maximum reading to the average output,

e. The ratio of the minimum reading to the average output, and

f. Comparisons of these values with FAA specified values.

In every group of fixtures, that is, touchdown zone, centerline, or other such group, a minimum of ten percent of the fixtures shall be evaluated at three different vertical angles, on the centerline of the light beam, and at two degrees above and below the centerline of the beam.

All sensor readings for the light fixture being evaluated shall be displayed simultaneously for operator and Airport representative review and evaluation. All sensor readings shall be recorded automatically through the computer and shall be printed out via computer-controlled printer. (Hand-written data recording will not be accepted.)

The measurements shall be compared to FAA standards as presented in FAA Advisory Circular AC 150/5345-46 (latest version) for each type of light fixture. The calculated averages shall be not less than the minimum average intensities specified in the Advisory Circular in order for that fixture to be considered acceptable. In addition, all other readings within the specified pattern shall be at least fifty percent of the specified minimum average intensity in order for the fixture to be considered acceptable.

If any of the calculated average readings is below the specified minimum average intensity, or if any individual reading is below fifty percent of the specified minimum average intensity, additional sets of readings shall be taken to identify the problem(s) with the fixture in question.

In order that there will be minimum impact on Airport operations, the taking of photometric data at any one fixture shall be completed within a time period of 30 seconds.

100a-1.3 RUNWAY AND TAXIWAY ACCESS TIME. In order to minimize the impact on airport operations, the collection of data shall be undertaken while the survey system is traveling along the runway or taxiway – typically the total runway or taxiway access time to survey one direction of a lighting system shall be less than 15 minutes. The testing shall take place during hours agreed upon with the Airport.

100a-1.4 TEST REPORTS – GENERAL. Initial Reports will be submitted periodically during the progress of the work so that corrective measures may be taken as may be required. If the corrective measures are promptly made, the fixtures involved will be reevaluated during the scheduled period of field testing to assure that proper performance has been achieved. If reevaluation cannot be done within this period, additional time and costs will be negotiated.

The final test results shall be documented in a Final Report, with six (6) copies submitted to the Airport. The Final Report shall present an evaluation of each fixture and guidance sign tested, including proposed corrective measures that do not meet the performance requirements.

100a-1.5 LIGHT FIXTURE TEST REPORTS. The final Light Fixture Test Report shall include the following:

a. The photometric condition of each new or relocated light fixture tested, as follows:

(1) Passes/Meets FAA Requirements - This classification includes those new light fixtures which exceed the FAA requirement based on the field test results, or, in the case of existing lighting systems, those fixtures which exceed 70 percent of FAA requirements.(FAA specifies that airfield lights must be replaced when the outputs are less than 70 percent of the required output.) In such cases, there is no need for any further action other than periodic monitoring. In the photometric data, when there is nothing indicated in the "Remarks" column, this indicates that the light fixture meets FAA Requirements.

(2) Investigate - These light fixtures have not met the FAA required photometric output for the particular type of light fixture based on the field test results. These fixtures should be investigated to determine why the performance is insufficient. Appropriate corrective measures need to be taken to bring the performance of these fixtures up to FAA standards and, then, the fixtures need to be retested to assure that the repairs/replacements are satisfactory. In the photometric data, these light fixtures are indicated by an "I" in the "Remarks" column.

b. Photometric test data tabulated with the following information:

(1) Fixture Number

(2) Light Direction - Direction of light beam

(3) Lens Color - Color of lens on fixture being tested

(4) Performance Bar Chart for each service. This shall provide a visual indication of overall performance for the service and identifies the relative position of sub-standard fixtures.

(5) Tabular list of the performance (in candela and as a percentage of the FAA standard) and color at each location.

(6) A list of locations where alignment may be a problem.

(7) A list of locations where average main beam intensity is below an agreed level.

(8) Remarks - Notes pertaining to the fixture being tested.

100a-1.6 SPARES. The Contractor shall furnish spare lamps, fixtures and lenses for use in correcting any deficiencies that may be found as follows:

a. For all in-pavement lighting systems - lamps - 15 percent.

There shall be a minimum of one unit of each element provided.

Any of these spares not used for correcting deficiencies shall be delivered to the Owner. These spares shall be included in the Contractor's proposal.

100a-1.7 CORRECTIVE ACTION. The Contractor shall be responsible for correcting any deficient condition identified as a result of the photometric testing at Contractor's expense. Retesting shall be performed to verify that any deficient condition has been successfully corrected at Contractor's expense.

METHOD OF MEASUREMENT

100a-2.1 ELECTRICAL TESTING SERVICES. The quantity to be paid for shall be for the Photometric Testing and Regulator Testing as completed, accepted, and ready for operation.

BASIS OF PAYMENT

100a-3.1 ELECTRICAL TESTING SERVICES. Payment will be made at the Contract Lump Sum Prices for the photometric testing of airfield lighting fixtures completed and accepted. These prices shall be full compensation for furnishing all materials and for all labor, equipment, tools, and incidentals necessary to complete this Item. Work under this Item shall be sufficient to include retesting of the fixtures found to be deficient in the initial testing and corrected by the Contractor.

Payment will be made under:

L-100a-3.1	Photometric Testing – Per Lump Sum

END OF ITEM L-100A

ITEM L-105 TEMPORARY ELECTRICAL ITEMS

DESCRIPTION

105-1.1 RELATED AND APPLICABLE DOCUMENTS. The publications listed at the end of this Item are incorporated herein by reference and form a part of this Item to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of this solicitation shall be applicable. In the text of this Item, such publications are referred to by basic designation only. Additional details and specifications pertaining to a specific item and/or assembly are contained in these documents and are to be considered as part of this Item. In the event of a conflict between contract documents and the referenced documents, the more stringent rule shall be applied.

This temporary work shall include but is not limited to the following:

- **a.** Installation and maintenance of temporary edge lighting and signing.
- **b.** Maintaining existing and proposed edge lighting and sign circuits.
- **c.** Coordinating with the FAA and the Airport to maintain existing FAA systems during Construction.
- **d.** Installation, maintenance, and removal of temporary sign and light covers.

EQUIPMENT AND MATERIALS

105-2.1 GENERAL. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufactures' certification of compliance with the applicable specification when so requested by the Engineer. Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20590, and shall be listed in Advisory Circular 150/5345-53, *Airport Lighting Equipment Certification Program.*

All Contractor parts and materials will be suitable for their intended purpose and will be adequately protected against corrosion. The components will have adequate capacity and will not be operated in excess of the component manufacturers' recommended rating. Any plastic components exposed to sunlight will be made of UV stabilized material. All fasteners will have corrosion protection. Copper bearing hardware in contact with aluminum will be plated with cadmium, nickel, and zinc. All hardware used for access for maintenance shall be stainless steel.

105-2.2 LIGHT BASE. Type L-867 or L-868 , Size B, meeting the requirements of Item L-867/868

105-2.3 ISOLATION TRANSFORMER. Type L-830, as required watts, 60 hertz, meeting the requirements of FAA Advisory Circular 150/5345-47.

105-2.4 HARDWARE. All bolts, nuts, washers and lock-washers shall be stainless steel.

105-2.5 PLUG AND RECEPTACLE CABLE CONNECTORS. L-823, Type I, Class A, meeting the requirements of FAA AC 150/5345-26 as required.

105-2.6 CONCRETE. Concrete used for any item under this specification shall comply with Technical Specification P-610, *Structural Portland Cement Concrete*.

105-2.7 UNDERGROUND ELECTRICAL CONDUIT AND DUCT. Equipment and materials shall be in accordance with Electrical Technical Specification Item L-110, *Airport Underground Electrical Conduit and Duct.*

105-2.8 CABLE. Equipment and materials shall be in accordance with Electrical Technical Specification Item L-108, *Underground Cable for Airports.*

105-2.9 GROUNDING. Equipment and materials shall be in accordance with Electrical Technical Specification Item L-100, *Electrical General Requirements.*

105-2.10 BLANK COVERS. Equipment and materials shall be in accordance with Electrical Technical Specification Item L-867/868, *Light Base and Transformer Housing,* Paragraph 867/868-2.8

105-2.11 SIGNS – REFLECTIVE. Equipment and materials shall be in accordance with FAA Advisory Circular 150/5345-44E for Style 4 unlighted signs.

105-2.12 TAXIWAY EDGE LIGHTS. Equipment and materials shall be in accordance with Item L-861T, *Elevated Medium Intensity Taxiway Edge Lights.*

105-2.13 UNLIGHTED SIGNS. Unlighted signs shall have sign panels constructed of aluminum, with stainless steel hardware, meeting the requirements of AC 150/5345-44. The background of sign faces, except for black, shall consist of retroreflective sheeting, with sign faces constructed by the direct applied characters process or the screen process for the required messaging. Signs shall meet the dimensions and legend requirements for Size 3 signs, and shall have mounting legs with frangible points for mounting on the concrete foundations installed for the permanent lighted signs. Stake mounting may only be used for temporary installations if concrete foundations cannot be made available for the unlighted signs, and if approved by the Airport Operations.

CONSTRUCTION METHODS

105-3.1 LOCATION. Temporary fixtures and assemblies shall be located as indicated on the plans.

105-3.2 TESTING. Refer to Item L-100, *Electrical General Requirements,* Paragraph L-100-3.9 for tests of applicable equipment.

105-3.3 ELECTRICAL. The construction methods for airfield electrical work shall conform to applicable sections of the National Electric Code (NEC) and local codes. All electrical connections to the unit will be made via watertight plugs and receptacles to allow the unit to pull free in the event it is struck by aircraft. The Contractor shall house any extra control circuitry in an enclosure to protect it from the environment. Install all underground cable in accordance with the applicable Advisory Circular, Specifications, and Item L-108, *Underground Cable for Airports,* as indicated and as directed. Use splices or appropriate plugs for all underground connections as specified in Item L-108.

All boxes shall have provision for grounding. All wiring entering the NAVAIDS must be through plugs and receptacles which will separate if the box is struck by an aircraft. The receptacles are located and held at the frangible point on the breakable coupling. All underground connections will be made with FAA approved splices or plugs and receptacles intended for that use.Interconnection wiring between the field mounted safety switch, transformer, and NAVAID shall be installed according to applicable specifications of Section L-108. This interconnecting wiring shall be paid for as part of the lump sum quantity for this item.

105-3.4 PHASING, INTERRUPTIONS AND TEMPORARY CABLES. Airfield power cables shall be kept in service to maintain runway and taxiway lighting as required for airfield operations. Temporary lighting and power cable may be run to maintain circuits to keep lighting operational. Temporary cable shall be placed above ground in temporary conduit or below ground in shallow buried conduit or existing conduit and shall be burial-type cable. The surface mounted conduit and cable shall be secured in place by use of sandbags placed at 5-feet maximum intervals. The use of temporary cable shall be approved by the Owner prior to installation and shall be promptly removed when the permanent construction is able to be used.

CONTRACTOR QUALITY CONTROL

105-4.1 QUALITY CONTROL. The Contractor shall develop a Quality Control Program in accordance with Section 100 of the FAA General Provisions. The program shall address all elements which affect the quality and performance of the temporary electrical items under this L-105 specification.

METHOD OF MEASUREMENT

105-5.1 TEMPORARY JUMPER CABLE. The footage of New L-824, Type C, 1/C #6, 5 kV Cable (Temporary) installed in duct or conduit to be paid for shall be the number of linear feet (LF) of cable, measured in-place, completed, ready for operation. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item as accepted by the Owner.

105-5.2 LONG TERM TEMPORARY DIRECT BURIED. The footage of Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable to be paid for shall be the number of linear feet (LF) of cable, including trenching and backfilling, measured in-place, completed, ready for operation. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item as accepted by the Owner.

105-5.3 LONG TERM SECONDARY, TEMPORARY. The footage of Long Term Secondary, (2) 1/C- #10, Temporary to be paid for shall be the number of linear feet (LF) of conductor, measured in-place, completed, ready for operation. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item as accepted by the Owner.

105-5.4 TEMPORARY CONDUIT. The footage of Temporary Single-way 2" Conduit to be paid for shall be the number of linear feet (LF) of conduit, measured in-place, completed, ready for operation. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item as accepted by the Owner.

105-5.5 LONG TERM TEMPORARY CONDUIT. The footage of Long Term Temporary Single-way 1-1/4" Conduit to be paid for shall be the number of linear feet (LF) of conduit, measured in-place, completed, ready for operation. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item as accepted by the Owner.

105-5.6 LONG TERM TEMPORARY ISOLATION TRANSFORMER. Payment shall be made at the contract unit price for the completed and accepted installation of each long term temporary elevated isolation transformer. The unit price shall be full compensation for furnishing, installing and removing each light and for all labor, equipment, tools, and incidentals necessary to complete this item.

105-5.7 LONG TERM TEMPORARY STAKE MOUNTED TAXIWAY EDGE LIGHTS - INSTALL. Payment shall be made at the contract unit price for the completed and accepted installation of each long term temporary stake mounted taxiway light. The unit price shall be full compensation for

furnishing and installing each light and for all labor, equipment, tools, and incidentals necessary to complete this item.

105-5.8 LONG TERM TEMPORARY STAKE MOUNTED TAXIWAY EDGE LIGHTS - REMOVE. Payment shall be made at the contract unit price for the accepted removal of each long term temporary stake mounted taxiway light. The unit price shall be full compensation for removing each light and for all labor, equipment, tools, and incidentals necessary to complete this item.

105-5.9 LONG TERM TEMPORARY PAVEMENT MOUNTED TAXIWAY EDGE LIGHTS - INSTALL. Payment shall be made at the contract unit price for the completed and accepted installation of each long term temporary pavement mounted taxiway light. The unit price shall be full compensation for furnishing and installing each light and for all labor, equipment, tools, and incidentals necessary to complete this item.

105-5.10 LONG TERM TEMPORARY PAVEMENT MOUNTED TAXIWAY EDGE LIGHTS - REMOVE. Payment shall be made at the contract unit price for the accepted removal of each long term temporary pavement mounted taxiway light. The unit price shall be full compensation for removing each light and for all labor, equipment, tools, and incidentals necessary to complete this item.

BASIS OF PAYMENT

105-6.1 TEMPORARY JUMPER CABLE. This Item shall consist of New L-824, Type C, 1/C #6, 5 kV Cable (Temporary) which shall include furnishing, installing and the removal of temporary cables. No separate measurement or payment will be made for moving temporary facilities as required to provide Contractor's access to work sites. The use of temporary cables covered under this item shall be limited to "jumpers" as required to maintain circuit continuity. Temporary cables may be removed from their initial use location and reused in additional temporary locations. Cable used for either type of temporary application shall not be used for permanent application.

105-6.2 LONG TERM TEMPORARY DIRECT BURIED. This Item shall consist of Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable which shall include furnishing, installing trenching, and backfilling of temporary cables.

105-6.3 LONG TERM SECONDARY, TEMPORARY. This Item shall consist of Long Term Secondary Conductors (2 1/C, #10, Temporary) and shall include installing within pavement joints as indicated on the drawings. Conductors are to be abandoned in-place at the end completion of this project.

105-6.4 TEMPORARY CONDUIT. This Item shall consist of Single-way 2" Conduit, Temporary (Allowance) and shall include furnishing new conduit and sand bags with the removal of temporary conduits and sandbags. No separate measurement or payment will be made for moving temporary facilities as required to provide Contractor's access to work sites. The use of temporary conduit covered under this item shall be limited to conduit for "jumpers" as required to maintain circuit continuity for the various stages of construction of this Project. Temporary conduit may be removed from their initial use location and reused in additional temporary locations. Conduit used for either type of temporary application shall not be used for permanent application.

105-6.5 LONG TERM TEMPORARY CONDUIT. This Item shall consist of Long Term (surface mounted and to remain in-place after completion of this project) Temporary Single-way 1-1/4" and shall include furnishing new conduit and conduit restraint devices as indicated on the drawings. No separate measurement or payment will be made for moving temporary facilities as required to provide Contractor's

access to work sites. The use of temporary conduit covered under this item shall be limited to conduit for "jumpers" as required to maintain circuit continuity after the completion of this Project.

105-6.6 LONG TERM TEMPORARY ISOLATION TRANSFORMER.. This Item shall consist of Long Term Temporary isolation transformer including, secondary cables and connectors and securing the entire assembly and its appurtenances.

105-6.7 LONG TERM TEMPORARY STAKE MOUNTED TAXIWAY EDGE LIGHTS - INSTALL. This Item shall consist of long term temporary taxiway edge lights (stake mounted) and involves the following work: Testing and assembly, including a mounting stake (as detailed on the plans), installing the light fixture, isolation transformer, secondary cables and connectors and securing the entire assembly and its appurtenances.

105-6.8 LONG TERM TEMPORARY STAKE MOUNTED TAXIWAY EDGE LIGHTS - REMOVE. This Item shall consist of the removal of long term temporary stake mounted taxiway edge lights and involves the following work: removing the light fixture, isolation transformer, and connector.

105-6.9 LONG TERM TEMPORARY PAVEMENT MOUNTED TAXIWAY EDGE LIGHTS - INSTALL. This Item shall consist of long term temporary taxiway edge lights (surface mounted and to remain in-place during the phasing of this project) and involves the following work: Testing and assembly, including a light base (as detailed on the plans), installing the light fixture, isolation transformer (if required per plans), secondary cables and connectors and securing the entire assembly and its appurtenances.

105-6.10 LONG TERM TEMPORARY PAVEMENT MOUNTED TAXIWAY EDGE LIGHTS - REMOVE. This Item shall consist of the removal of long term temporary taxiway edge lights and involves the following work: removing the light fixture, isolation transformer, and connector, recessing conductor ends into pavement joint past backer rod and repairing as per associated pavement joint detail.

Payment will be made under:

Item L-105-6.1	Temporary Jumper L-824, Type C, 1/C #6, 5 kV Cable in Conduit– per LF
Item L-105-6.2	Long Term Temporary Direct Buried L-824, Type C, 1/C #6, 5 kV Cable – per LF
Item L-105-6.3	Long Term Temporary Secondary Circuit, (2)-1/C #10 – per LF
Item L-105-6.4	Temporary Surface Mounted Single-way 2" Conduit – per LF
Item L-105-6.5	Long Term Temporary Single-way 1-1/4" Conduit – per LF
Item L-105-6.6	Long Term Temporary Isolation Transformer – Install – per EA
Item L-105-6.7	Long Term Temporary Stake Mounted Taxiway Edge Lights –Install – per EA
Item L-105-6.8	Long Term Temporary Stake Mounted Taxiway Edge Lights –Remove – per EA

Item L-105-6.9	Long Term Temporary Pavement Mounted Taxiway Edge Lights –Install – per EA
Item L-105-6.10	Long Term Temporary Pavement Mounted Taxiway Edge Lights – Remove – per EA

FEDERAL AVIATION ADMINISTRATION (FAA) SPECIFICATIONS APPLICABLE TO ITEM L-105: All references are to be current edition.

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-7	Specification for L-824 Underground Electrical Cables for airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors (including Changes 1 & 2)
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes and Accessories (including Changes)
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program

END OF ITEM L-105

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing power cables direct buried and furnishing and/or installing power cables within conduit or duct banks in accordance with 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 Engineer. 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 any cable for FAA facilities. Requirements and payment for trenching and backfilling for the installation of underground conduit and duct banks are covered under Item L-110, *Airport Underground Electrical Duct Banks and Conduits.*

EQUIPMENT AND MATERIALSN

108-2.1 GENERAL.

a. Airport lighting equipment and materials covered by Federal Aviation Administration (FAA) specifications shall be approved under the Airport Lighting Equipment Certification Program described in Advisory Circular (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 Engineer.

c. Manufacturer's certifications shall not relieve the Contractor of the Contractor’s responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

d. All materials and equipment used to construct this item shall be submitted to the Engineer for approval prior to ordering the equipment. Submittals consisting of marked catalog sheets or shop drawings shall be provided. Submittal data shall be presented in a clear, precise and thorough manner. Original catalog sheets are preferred. Photocopies are acceptable provided they are as good a quality as the original. Clearly and boldly mark each copy to identify pertinent products or models applicable to this project. Indicate all optional equipment and delete non-pertinent data. Submittals for components of electrical equipment and systems shall identify the equipment for which they apply on each submittal sheet. Markings shall be boldly and clearly made with arrows or circles (highlighting is not acceptable). Contractor is solely responsible for delays in project accruing directly or indirectly from late submissions or resubmissions of submittals.

e. The data submitted shall be sufficient, in the opinion of the Engineer, to determine compliance with the plans and specifications. The Contractor’s submittals shall be neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer’s opinion, does not meet the system design and the standards and codes, specified herein.

f. All equipment and materials furnished and installed under this section shall be guaranteed against defects in materials and workmanship for a period of at least twelve (12) months from final acceptance by the Owner. The defective materials and/or equipment shall be repaired or replaced, at the Owner's discretion, with no additional cost to the Owner. The Contractor shall be responsible to maintain an insulation resistance of 50 megohms minima, (1000V megger) with isolation transformers connected in new circuits and new segments of existing circuits through the end of the contract warranty period.

108-2.2 CABLE. Underground cable for airfield lighting facilities (runway and taxiway lights and signs) shall be Type C, No. 6 and No. 8 AWG, copper, 7 strand, single conductor cable with 5,000 volt cross-linked polyethylene insulation and shall conform to the requirements of AC 150/5345-7, *Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits*. 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 Federal Specification J-C-30 and shall be type THWN-2.

Cable type, size, number of conductors, strand and service voltage shall be as specified on the plans.

108-2.3 BARE COPPER WIRE (COUNTERPOISE OR GROUND) AND GROUND RODS. Wire for counterpoise or ground installations for airfield lighting systems shall be No. 6 AWG solid for counterpoise and or No. 6 AWG stranded for ground wire conforming to ASTM B 3 and ASTM B 8, and shall be bare copper wire conforming to the requirements of ASTM D 33.

Ground rods shall be copper-clad steel and be 3/4-inch diameter by 10 feet long. Ground rods for counterpoise shall be installed at a maximum of 500 foot spacing.

108-2.4 CABLE CONNECTIONS. In-line connections 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 Field-attached Plug-in Splice.** Figure 3 of AC 150/5345-26, *Specification for L-823 Plug and Receptacle, Cable Connectors*, employing connector kits, is acceptable for field attachment to single conductor cable. It shall be the Contractor’s responsibility to determine the outside diameter of the cable to be spliced and to furnish appropriately sized connector kits and/or adapters and heat shrink tubing with integral sealant.

b. **The Factory-Molded Plug-in Splice.** Specification for L-823 Connectors, Factory-Molded to Individual Conductors, is acceptable.

c. In all the above cases, connections of cable conductors shall be made using crimp connectors utilizing 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 in accordance with the manufacturer’s recommendations and listings.

d. All connections of counterpoise, grounding conductors and ground rods shall be made by the exothermic process or approved equivalent, except the base can ground clamp connector shall be used for attachment to the base can. All exothermic connections shall be made in accordance with the manufacturer’s recommendations and listings.

108-2.5 SPLICER QUALIFICATIONS. Every airfield lighting cable splicer shall be qualified in making cable splices and terminations on cables rated above 5,000 volts AC. The Contractor shall submit to the Engineer proof of the qualifications of each proposed cable splicer for the 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 for cable markers shall conform to Specification Item P-610, *Structural Portland Cement Concrete*.

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 (CLSM)*.

108-2.8 CABLE IDENTIFICATION TAGS. Cable identification tags shall by made from a non-corrosive type material with the circuit identification stamped or etched or printed 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 – number Scotch 88 (1-1/2" wide) and Scotch 130C linerless rubber splicing tape (2" wide), as manufactured by the Minnesota Mining and Manufacturing Company, or approved equivalent.

108-2.10 ELECTRICAL COATING. Scotchkote shall be as manufactured by Minnesota Mining and Manufacturing Company, or approved equivalent.

108-2.11 EXISTING CIRCUITS. Whenever the scope of work requires, connection to an existing circuit, the circuit's insulation resistance shall be tested, in the presence of the Engineer. The test shall be performed in accordance with this item and prior to any activity affecting the respective circuit. The Contractor shall record the results on forms acceptable to the engineer. When the work affecting the circuit is complete, the circuit's insulation resistance shall be checked again, in the presence of the Engineer. The Contractor shall record the results on forms acceptable to the engineer. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the 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.

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. Wherever possible, cable shall be run without splices, from connection to connection.

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 Engineer 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 or at least once in each access point where L-823 connectors are not installed.

Provide not less than 4 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 base cans, junction and access structures to allow for future connections, or as designated by the Engineer.

108-3.2 INSTALLATION IN DUCT BANKS OR CONDUITS. This item includes the installation of the cable in duct banks or conduit as described below. 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 in accordance with the latest 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 interferences are avoided.

Duct banks or conduits shall be installed as a separate item in accordance with 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 insure that the duct bank or conduit is open, continuous and clear of debris. Mandrel size shall be compatible with conduit size. The Contractor shall swab out all conduits/ducts and clean base can, manhole, etc. interiors IMMEDIATELY prior to pulling cable. Once cleaned and swabbed the base cans 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 recleaned 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. The cable shall be installed in a manner to prevent harmful stretching of the conductor, injury 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 handwinch or power winch with the use of cable grips or pulling eyes. Maximum pulling tensions shall be governed by cable manufacturer’s recommendations. A non-hardening lubricant recommended for the type of cable being installed shall be used where pulling lubricant is required.

Contractor shall submit pulling tension values to the Engineer prior to any cable installation. If cables are installed by the use of mechanical means (i.e. not by hand), pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the Engineer. Cable pull tensions shall be recorded by the Contractor and reviewed by the Engineer. 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 the 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 Engineer, 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 utilize other appropriate means to prevent abrasion to the cable jacket.

108-3.3 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. Field-attached Plug-in Splices. These shall be assembled in accordance with manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. In all cases the joint where the connectors come together shall be 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.

b. Factory-Molded Plug-in Splices. These shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together shall be 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 (37 mm) on each side of the joint.

108-3.4 BARE WIRE INSTALLATION FOR SAFETY OR EQUIPMENT GROUNDING. As shown on the details or included in the job specifications, a bare copper grounding wire shall be installed for safety (personnel protection) per paragraph 12.6 of AC-150-5340-30C, "Design and Installation Details for Airport Visual Aids". The safety ground shall be a #6 AWG bare jumper connected to the ground lug at the fixture base to a ground rod installed beside the fixture. The resistance to ground of the base must be 25 ohms or less per measurement with a ground tester. See the NEC Handbook for additional information about grounding electrode installation and testing. **The equipment ground shall be incidental to the installation of each base, light or sign.**

108-3.5 BARE COUNTERPOISE WIRE INSTALLATION FOR LIGHTNING PROTECTION AND GROUNDING. If shown on the plans or included in the job specifications, bare counterpoise copper wire shall be installed for lightning protection of the underground cables. 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. Where the cable or duct/conduit trench runs outside the edge of pavement, the counterpoise shall be installed in a separate trench located half the distance between the pavement edge and the cable or duct/conduit trench. In trenches under pavement sections, counterpoise wire shall be installed continuously a minimum of 4 inches above the cable, conduit or duct bank, or as shown on the plans if greater. Additionally, counterpoise wire shall be installed at least 8 inches below the top of subgrade in paved areas or 10 inches below finished grade in un-paved areas. This dimension may be less than 4 inches where conduit is to be embedded in existing pavement. Counterpoise wire shall not be installed in conduit.

The counterpoise wire shall be routed around to each light fixture base, mounting stake, or junction/access structures. 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.

If shown on the plans or in the specifications, a separate equipment (safety) ground system shall be provided in addition to the counterpoise wire using one of the following methods:

(1) A ground rod installed at and securely attached to each light fixture base, mounting stake if painted, and to all metal surfaces at junction/access structures.

(2) Install an insulated equipment ground conductor internal to the conduit system and securely attached it to each light fixture base and to all metal surfaces at junction/access structures. This equipment ground conductor shall also be exothermically welded to ground rods installed not more than 500 feet apart around the circuit.

a. 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 cone 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 cone of protection measured 22 ½ 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.

b. 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.

108-3.6 EXOTHERMIC BONDING. Bonding of counterpoise wire shall be by the exothermic welding process. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the Engineer, 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. For welds at light fixture base cans, all galvanized coated surface areas and "melt" areas, both inside and outside of base cans, damaged by exothermic bond process shall be restored by coating with a liquid cold-galvanizing compound conforming to U.S. Navy galvanized repair coating meeting Mil. Spec. MIL-P-21035. Surfaces to be coated shall be prepared and compound applied in accordance with manufacturer's recommendations.

c. All buried copper and weld material at weld connections shall be thoroughly coated 6 mil of 3M “Scotchkote,” or approved equivalent, or coated with coal tar bitumastic material to prevent surface exposure to corrosive soil or moisture."

108-3.7 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 Engineer. The Contractor shall demonstrate the electrical characteristics to the satisfaction of the Engineer. All costs for testing are incidental to the respective item being tested. For phased projects, the tests must be completed by phase and results meeting the specifications below must be maintained by the Contractor throughout the entire project as well as during the ensuing warranty period.

Earth resistance testing methods shall be submitted to the Engineer for approval. Earth resistance testing results shall be recorded on an approved form and testing shall be performed in the presence of the Engineer. All such testing shall be at the sole expense of the Contractor.

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 Engineer 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 Engineer the following:

a. That all affected lighting power and control circuits (existing and new) are continuous and free from short circuits.

b. That all affected circuits (existing and new) are free from unspecified grounds.

c. That the insulation resistance to ground of all new non-grounded series circuits or cable segments is not less than 50 megohms.

d. That the insulation resistance to ground of all non-grounded conductors of new multiple circuits or circuit segments is not less than 50 megohms.

e. That all affected circuits (existing and new) are properly connected in accordance with applicable wiring diagrams.

f. 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.

g. 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 utilized, as described by ANSI/IEEE Standard 81, to verify this requirement.

Two copies of tabulated results of all cable tests performed shall be supplied by the Contractor to the Engineer. Where connecting new cable to existing cable, ground 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 NEW CABLE. The footage of new cable installed in duct or conduit to be paid for shall be the number of linear feet (LF) of cable as described in the E4 series, measured in-place, completed, ready for operation. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item as accepted by the Owner.

BASIS OF PAYMENT

108-5.1 NEW CABLE. This Item shall consist of new cable installed in conduit or duct through manholes, handholes, or light bases (includes a coil of slack cable at each fixture or device termination and a coil of slack cable at each handhole as indicated in the details) in-place by the Contractor and accepted by the Owner. This Item shall include furnishing all materials and for all preparation and installation of these materials and for all labor, equipment, tools, and incidentals necessary to complete this Item. Cable terminations and testing shall be incidental to each type of cable installation. Removal and reinstallation of devices as required for testing or the connection of temporary circuits or for the reconnection of permanent circuits shall be incidental to the respective cable installation.

Payment will be made under:

Item L-108-5.1	L-824, Type C, 1/C #8, 5 kV Cable – per LF
Item L-108-5.2	L-824, Type C, 1/C #6, 5 kV Cable – per LF
Item L-108-5.3	Bare, 1/C #6, Counterpoise Cable – per LF

MATERIAL REQUIREMENTS

AC 150/5345-7	Specification for L-824 Underground Electrical Cables for airport Lighting Circuits
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors (including Changes 1 and 2)
FED SPEC J-C-30	Cable and Wire, Electrical Power, Fixed Installation (cancelled; replaced by A-A-59544 Cable and Wire, Electrical (Power, Fixed Installation))
FED SPEC A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic
ASTM B 3	Soft or Annealed Copper Wire
ASTM D 4388	Rubber tapes, Nonmetallic Semiconducting and Electrically Insulating

REFERENCE DOCUMENTS

NFPA No. 70	National Electrical Code (NEC)

MIL-S-23586C	Sealing Compound, Electrical, Silicone Rubber

Building Industry Consulting Service International (BICSI)

ANSI/IEEE Std 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System

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) installed in accordance with this specification at the locations and in accordance with 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 in-field paving, trenching, backfilling, removal, and restoration of any paved or "dirt" areas; concrete encasement, mandreling, pulling lines, duct markers, plugging of conduits, and the testing of the installation as a completed system ready for installation of cables in accordance with the plans and specifications. This item shall also include furnishing and installing conduits and 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 so requested by the Engineer.

b. Manufacturer's certifications shall not relieve the Contractor of the Contractor's responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

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 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.

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 neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer's opinion, does not meet the system design and the standards and codes, specified herein.

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 conduit and fittings shall be hot dipped galvanized inside and out and conform to the requirements of Underwriters Laboratories Standard 6, 514B, and 1242.

110-2.3 PLASTIC CONDUIT. Plastic conduit and fittings-shall conform to the requirements of Fed. Spec. W-C-1094, Underwriters Laboratories Standards UL-651 and Article 347 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.

The type of adhesive 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/DUCT SPACER SYSTEM. On all multiple conduit arrays, the Contractor shall furnish and install a conduit spacer system as required to maintain uniform conduit spacing. The system shall consist of plastic spacers that interlock vertically and horizontally. A spacer assembly shall consist of base spacers, intermediate spacers, and top spacers to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of five spacer assemblies per 20 feet of 2" conduit array or a minimum of four spacer assemblies per 20 feet of 4" and larger conduit arrays. 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 3/4 inch maximum size coarse aggregate with a minimum 28 day compressive strength of 4,000 psi. Where reinforced duct banks are specified, reinforcing steel shall conform to ASTM A 615 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"

110-2.8 DETECTABLE WARNING TAPE. Plastic, detectable, yellow magnetic tape shall be polyethylene film with a metallized foil core and shall be 4-6 inches wide. Detectable tape is incidental to the respective bid item.

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 installed 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 base cans, manhole, 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 cleaned again 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 contaminate 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 utilized when crossing under pavements expected to carry aircraft loads.

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. Flowable backfill may

alternatively be used The Contractor shall ascertain the type of soil or rock to be excavated before bidding.

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 six inches above the duct/conduit or the counterpoise wire if present.

Joints in plastic conduit shall be prepared in accordance with 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 in accordance with 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, in accordance with 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 off site.

Any excess excavation shall be filled with suitable material approved by the Engineer and compacted in accordance with 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 insure that these cable(s) 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 24 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 underdrains 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, proper 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. Where two or more conduits in the duct bank are intended to carry conductors of equivalent voltage insulation rating, the Contractor shall space the conduits not less than 1-1/2 inches apart (measured from outside wall to outside wall). Where two or more conduits in the duct bank are intended to carry conductors of differing voltage insulation rating, 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. End bells or couplings shall be installed flush with the concrete encasement at access points.

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, 4-6 inch wide tape 8 inches minimum below grade above all underground conduit or duct lines not installed under pavement.

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, and 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. Flowable backfill may alternatively used.

Unless otherwise shown on plans, conduits shall be installed so that the tops of all conduits are at least 18 inches below the finished grade.

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 2 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 2 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 spaced not less than 3 inches apart (measured from outside wall to outside wall) in a horizontal direction and lot 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 12 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 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 in accordance with Item P-152, *Excavation and Embankment*, except that material used for back fill shall be select material not larger than 4 inches in diameter.

Flowable 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 in accordance with instructions issued by the Engineer.

110-3.5 BACKFILLING FOR DUCT BANKS. After the concrete has cured, the remaining trench shall be backfilled and compacted in accordance with 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.

Flowable 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 in accordance with instructions issued by the Engineer.

110-3.6 RESTORATION. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the work shall be restored to its original condition. The restoration shall be as shown on the civil plans. 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.

METHOD OF MEASUREMENT

110-4.1 NEW UNDERGROUND CONDUITS AND DUCT BANKS. The footage of new underground conduits and duct banks shall be measured by the linear feet (LF) of conduits and duct banks and for electrical system drain lines, installed, all measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes. The unit price shall be full compensation for all labor, materials, equipment and incidentals necessary to complete the item.

BASIS OF PAYMENT

110-5.1 NEW UNDERGROUND CONDUITS AND DUCT BANKS. This Item shall consist of each type and size of conduit and duct bank completed and accepted, including trench, locator tape, encasement and backfill with the designated material. Work shall include 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 in accordance with the provisions and intent of the plans and specifications.

Payment will be made under:

Item L-110-5.1	Single-way 2" Conduit, Direct Buried – per LF
Item L-110-5.2	Multi-way (8)-2-inch Conduits, Direct Buried – per LF
Item L-110-5.3	Single-way 2" Conduit, Concrete Encased – per LF
Item L-110-5.4	Multi-way (4)-2-inch Conduits, Concrete Encased – per LF
Item L-110-5.5	Multi-way (8)-2-inch Conduits, Concrete Encased – per LF
Item L-110-5.6	Multi-way (4)-2-inch HDPE Conduits, Concrete Encased – per LF
Item L-110-5.7	Single-way 2" Conduit, Saw-cut in Existing PCCP – per LF
Item L-110-5.8	System Drain, (1) 2" Conduit, Concrete Encased – per LF

MATERIAL REQUIREMENTS

Fed.Spec.W-C-1094	Conduit and Conduit Fittings; Plastic, Rigid (cancelled; replaced by UL 514 Boxes, Nonmetallic Outlet, Flush Device Boxes, and Covers, and UL 651 Standard for Conduit and Hope Conduit, Type EB and A Rigid PVC)
Underwriters Laboratories Standard 6	Rigid Metal Conduit
Underwriters Laboratories Standard 514B	Fittings for Cable and Conduit
Underwriters Laboratories Standard 1242	Intermediate Metal Conduit
Underwriters Laboratories Standard 651	Schedule 40 and 80 Rigid PVC Conduit (for Direct Burial)
Underwriters Laboratories Standard 651A	Type EB and A Rigid PVC Conduit and HDPE Conduit (for concrete encasement)

END OF ITEM L-110

ITEM L-115 ELECTRICAL HANDHOLES AND JUNCTION STRUCTURES

DESCRIPTION

115-1.1 This item shall consist of electrical handholes and junction structures (pullboxes, junction cans, handhole extensions etc.) installed in accordance with 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 handhole and/or junction structures with all associated excavation, backfilling, sheeting and bracing, concrete, reinforcing steel, appurtenances, testing, dewatering and restoration of surfaces to the satisfaction of the Engineer.

EQUIPMENT AND MATERIALS

115-2.1 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 so requested by the Engineer.

b. Manufacturer's certifications shall not relieve the Contractor of the Contractor’s responsibility to provide materials in accordance with these specifications and acceptable to the Engineer. Materials supplied and/or installed that do not materially comply with these specifications shall be removed, when directed by the Engineer and replaced with materials, which do comply with these specifications, at the sole cost of the Contractor.

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 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.

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 neatly bound in a properly sized 3-ring binder, tabbed by specification section. The Engineer reserves the right to reject any and all equipment, materials or procedures, which, in the Engineer’s opinion, does not meet the system design and the standards and codes, specified herein.

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.

115-2.2 CONCRETE STRUCTURES. Cast-in-place concrete structures shall conform to the details and dimensions shown on the plans. 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 150,000 lb. 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 in accordance with the process defined in the General Provisions.

115-2.3 JUNCTION CANS. Junction cans shall be L-867 Class 1 (non-load bearing) or L-868 Class 1 (load bearing) cans encased in concrete. The cans shall have a galvanized steel blank cover, gasket, and stainless steel hardware. Covers shall be 3/8" thickness for L-867 and 3/4" 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 conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144. Hydrated lime may be added to the mixture of sand and cement in an amount not to exceed 15 percent of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C 6. The water shall be clean and free of deleterious amounts of acid, alkalis or organic material. If the water is of questionable quality, it shall be tested in accordance with AASHTO T-26.

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. Gray iron castings shall meet the requirements of ASTM A 48.

b. Malleable iron castings shall meet the requirements of ASTM A 47.

c. Steel castings shall meet the requirements of ASTM A 27.

d. Structural steel for frames shall conform to the requirements of ASTM A-283, Grade D.

e. Ductile iron castings shall conform to the requirements of ASTM A 536.

f. Austempered ductile iron castings shall conform to the requirements of ASTM A 897.

All castings specified shall withstand a maximum tire pressure of 250 psi and maximum load of 75,000 pounds.

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 A 123.

Each cover shall have the word "ELECTRIC", “COMM” or other approved designation cast on it. Each frame and cover shall be as shown on the plans or approved equivalent.

115-2.7 REINFORCING STEEL. All reinforcing steel shall be deformed bars of new billet steel meeting the requirements of ASTM A 615, Grade 60.

115-2.8 BEDDING/SPECIAL BACKFILL. Bedding or special backfill shall be as shown on the plans.

115-2.9 FLOWABLE BACKFILL. Flowable material used to backfill shall conform to the requirements of Item P-153 *Controlled Low Strength Material (CLSM)*.

115-2.10 PLASTIC CONDUIT. Plastic conduit shall comply with Item L-110, *Airport Underground Electrical Duct Banks and Conduits*.

115-2.11 CONDUIT TERMINATORS. Conduit terminators shall be pre-manufactured for the specific purpose and sized as required or as shown on the plans.

115-2.12 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). 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.

115-2.13 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.

115-2.14 CABLE RACKS. All manholes and handholes shall be fitted on each wall with two (2) 24-inch galvanized inserts for cable racks (Unistrut P-3000 or equal). Each rack shall be provided with a minimum of two (2) saddle rack type arms with (2) saddles. Rack arms shall be made of non-flammable polymer as manufactured by Underground Devices, Inc., or equal, or as detailed on the drawings.

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 at Contractor’s expense.

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, in accordance with 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 6-inches of sand 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, *Structural Portland Cement Concrete*. 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. Ladders are not required for this project.

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 six (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, *Excavation and Embankment*. Each layer shall be deposited all around the structure to approximately the same elevation. The P-152 backfill shall continue to within 3” of finished grade in areas where the existing grade treatment is asphalt, or to existing finished grade in areas of exposed earth. In areas where the existing grade treatment is asphalt, finish fill to grade with P-403 asphalt. The top of the fill shall meet the existing elevation or as directed by the Engineer.

In lieu of the paragraph above, at the Contractor’s option, backfill may be made by the use of P-153 (CLSM) to within 3” of finished grade. In areas where the existing grade treatment is asphalt, finish fill to grade with P-403 asphalt. In areas of exposed earth, finish fill to existing finished grade with P-152. The top of the fill shall meet the existing elevation 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 in-situ 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 1 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.

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 1 foot above the floor of the structure and separate from other cables. No. 2 AWG bare copper pigtails 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. 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 conforming MIL-P-21035. Surfaces shall be prepared and compound applied in accordance with 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 backfill compacted to match surrounding areas, and surfaces shall be repaired using materials comparable to original materials.

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 utilizing the fall-of-potential ground impedance test as described by 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 NEW ELECTRICAL STRUCTURE. The quantity of new electrical handhole, structures shall be measured by each type of unit completed in place. The unit price shall be full compensation for all labor, materials, equipment, testing and incidentals necessary to complete the Item as accepted by the Owner.

BASIS OF PAYMENT

115-5.1 NEW ELECTRICAL STRUCTURE. This Item shall consist of each type and size of new electrical handhole structures will be paid for at the Contract unit price per each, complete and in place. The work shall include 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. The work for each unit specifically includes, but is not limited to, the following items:

- All Required Excavation
- Sheeting and Bracing
- Dewatering If Required
- All Required Connections
- Temporary Cables and Connections
- Ground Rod Testing
- All Required Backfilling with On-Site Materials
- Restoration of All Surfaces and Finished Grading, Sodding

Payment will be made under:

Item L-115-5.1	New Concrete Handhole, Type II, Furnished & Installed – per Each
Item L-115-5.2	Two-Can Junction Can Plaza, Furnished & Installed – per Each

MATERIAL REQUIREMENTS

ANSI/IEEE Std 81	IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
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
FED SPEC J-C-30	Cable and Wire, Electrical Power, Fixed Installation (cancelled; replaced by AA-59544 Cable and Wire, Electrical (Power, Fixed Installation))
ASTM B.3	Soft or Annealed Copper Wire
ASTM B.8	Concentric-Lay-Stranded Copper Conductor, Hard, Medium-Hard, or Soft

END OF ITEM L-115

ITEM L-850 RUNWAY IN-PAVEMENT LIGHTS

DESCRIPTION

850-1.1 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions apply to work specified in this Item.

850-1.2 GENERAL. This Item shall consist of installing new L-850C, Style 3 (aka "flush"), in-pavement, runway edge lights in accordance with these specifications and at the locations shown on the Plans and light fixture schedule. This Item shall also consist of salvage and reinstallation of the L-850A runway centerline lights and L-850B touchdown zone lights onto new L-868 bases.

This Item involves the following work:

For L-850C:

a. Install new conduit system (paid for and specified under Item L-110) and install bottom portions of 24-inch-deep L-868 bases (paid for and specified under Item L-867/868) in runway as shown on the Plans. Install temporary "mud" covers on bases for paving operation.

b. Core drill pavement and install Type L-868 base extensions at indicated locations. Encase the L-868 extensions with sealant per Item L-867/868 and according to detail shown on Plans. Installation of L-868 bases shall be paid for and specified under Item L-867/868.

c. Install all new 5 kV lighting cable between lights for entire circuit (paid for and specified under Item L-108).

d. Install flush-in-pavement light fixtures including new isolation transformers and connectors.

850-1.3 LOCATION/ELEVATION. Lights shall be spaced on centers as indicated on the Plans. Centerline lights shall be located 2'-6" (+0", -6") from runway centerline to center of fixture. Longitudinal tolerance is as indicated on the pavement coordination drawings.

Elevation of in-pavement bases shall be set so that, including extension rings, the light fixture flange shall be within +0/-1/8-inch of the finished pavement surface.

850-1.4 IDENTIFICATION NUMBERS. See L-867/868 for identification numbers.

850-1.5 AIMING.

a. L-850A, Centerline. The axis of the fixture through the light beam shall be parallel to the centerline of the runway.

b. L-850B, TDZ. The axis of the fixture through the light beam shall be parallel to the centerline of the runway. The indicator arrow on the top of the fixture shall point toward the runway centerline.

c. L-850C, Edge. The axis of the fixture through the light beam shall be parallel to the centerline of the runway. The indicator arrow on the top of the fixture shall point toward the runway.

850-1.6 LIGHT BASE AND LIGHT INSTALLATION ALIGNMENT TOOL. See Item L-867/868

850-1.7 SHOP DRAWINGS AND MATERIAL LISTS. Shall be in accordance with Item L-100, Paragraph 100-1.6, for the following equipment:

a. L-850C (edge), Style 3 light fixture.

b. L-830 Isolation transformer.

850-1.8 TESTING. Refer to Item L-100, Paragraph 100-3.8 for tests of applicable equipment.

MATERIALS

850-2.1 GENERAL. Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20590, and shall be listed in Advisory Circular 150/5345-53A, Airport Lighting Equipment Certification Program. All in-pavement lights shall meet the requirements of AC 150/5345-46, current edition.

850-2.2 FLUSH IN-PAVEMENT RUNWAY LIGHT FIXTURES. Fixtures shall meet the requirements of FAA AC 150/5345-46, be suitable for use with a 20 amp primary/6.6 amp secondary circuits and mount on a 12-inch diameter (Size B) L-868 base can. The reveal above the adjacent pavement surface shall not exceed 0.25-inch. Provide with grounding lug (see Plans). All Lamps shall be 6.6 amp quartz type. Fixture shall be of the following configurations:

a. L-850C (one cord set, 105 watt lamp with white or amber optical system as indicated on the plans);

b. Existing L-850A (centerline) fixtures have a two cord set configuration with two 48 watt lamps. Two isolation transformers will be required for each fixture.

c. Existing L-850B (touchdown zone) fixtures have a single cord set configuration with one 48 watt lamp.

850-2.3 LIGHT BASE. See Item L-867/868. Size B, 24-inch-deep, one or two-piece, with appurtenances, meeting the requirements of FAA AC 150/5345-42, current edition.

850-2.4 RUNWAY IN-PAVEMENT LIGHT ISOLATION TRANSFORMER. Type L-830, 20A/6.6A, 60 hertz, of the appropriate wattage for the type of associated fixtures per manufacturer's recommendation, meeting the requirements of FAA AC 150/5345-47, current edition.

850-2.5 HARDWARE. All bolts, nuts, washers and lockwashers shall be stainless steel. Install using high temperature anti-seize compound.

850-2.6 CABLE. See Item L-108. Type L-824C, 5 kV, and 600 V, meeting the requirements of FAA AC 150/5345-7, current edition. The 600V cable for the secondary between the in-pavement fixture and isolation transformer shall be incidental to, and integral with, the L-830 isolation transformer.

850-2.7 PLUG AND RECEPTACLE CABLE CONNECTORS. Type I, Class A, meeting the requirements of FAA AC 150/5345-26, current edition.

850-2.8 CONCRETE. Concrete for backfill shall conform to the requirements of Item P-610, *Structural Portland Cement Concrete* (4,000 psi).

850-2.9 GROUT AND SEALANT. See Item L-867/868.

METHOD OF MEASUREMENT

850-3.1 SALVAGE AND REINSTALL IN-PAVEMENT FIXTURES. The quantity to be measured shall be for the salvage and reinstallation of the existing flush in-pavement runway lights on new or existing bases with isolation transformers, connectors, lighting cable, in accordance with the Plans and Specifications and as accepted

850-3.2 NEW FLUSH RUNWAY EDGE LIGHTS. The quantity to be measured shall be for the installation of the new flush in-pavement runway edge lights on new or existing bases with isolation transformers, connectors, lighting cable, in accordance with the Plans and Specifications and as accepted.

BASIS OF PAYMENT

850-4.1 SALVAGE AND REINSTALL IN-PAVEMENT FIXTURES. Payment for the salvage and reinstallation of existing flush runway lights shall be made at the contract unit price for installing said lights. The unit price shall be full compensation for furnishing all materials and for all preparation, erection and installation of these materials to complete the item

850-4.2 NEW FLUSH RUNWAY EDGE LIGHTS. Payment for the installation of new flush runway edge lights shall be made at the contract unit price for installing said lights. The unit price shall be full compensation for furnishing all materials and for all preparation, erection and installation of these materials to complete the item

Payment will be made under:

Item L-850-4.1	Salvage and Reinstall In-Pavement L-850A Runway Centerline Light with New Isolation Transformer on New or Existing Base– per Each
Item L-850-4.2	Salvage and Reinstall In-Pavement L-850B Runway TDZ Light with New Isolation Transformer on New or Existing Base – per Each
Item L-850-4.3	New In-Pavement L-850C, Runway Edge Light with New Isolation Transformer on New or Existing Base – per Each

REFERENCED PUBLICATIONS

850-5.1 FAA SPECIFICATIONS REFERENCED IN L-850. All references shall be current edition.

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 (including Changes 1 & 2)
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes and Accessories (including Changes)

AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program

END OF ITEM L-850

ITEM L-852 FLUSH TAXIWAY IN-PAVEMENT LIGHTS

DESCRIPTION

850-1.1 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions apply to work specified in this Item.

850-1.2 GENERAL. This Item shall consist of installing new style 3 (aka "flush") L-852A and L-852K in-pavement taxiway centerline lights in accordance with these specifications and at the locations shown on the Plans and light fixture schedule. Installation or modification of L-868 bases shall be covered under Section L-867/868.

This Item involves the following work.

a. Installing new and existing/salvaged Type L-852 in-pavement taxiway centerline light fixtures including new isolation transformers (for both new and existing fixtures) and connectors as detailed on the plans.

b. Testing fixtures per Item L-100 and Item L-100a.

850-1.3 LOCATION/ELEVATION. Lights shall be spaced on centers as indicated on the Plans. Centerline lights shall be located 2'-6" (+0", -6") from taxiway centerline to center of fixture. Longitudinal tolerance is as indicated on the pavement coordination drawings.

Elevation of in-pavement bases shall be set so that, including extension rings, the light fixture flange shall be within +0/-1/8-inch of the finished pavement surface.

850-1.4 IDENTIFICATION NUMBERS. Identification numbers are provided on the plans for construction purposes.

850-1.5 AIMING.

a. On Straight Portions. On all straight portions of taxiway centerlines, the axis of the taxiway centerline light (L-852A) beam shall be parallel to the centerline of the taxiway path.

b. On Curved Portions.

1. Orient the axis of a bi-directional light (L-852K) beam so that it is perpendicular to the radius of the centerline curve.

850-1.6 LIGHT BASE AND LIGHT INSTALLATION ALIGNMENT TOOL. The tolerance requirements for location, elevation, and orientation of all light fixtures is of critical importance and must be maintained. In order to do so the light bases and lights shall be installed using an installation and alignment tool. This tool shall be capable of achieving the final alignment specified and shall be of sufficient strength to support the light base during placement and compaction of concrete around the base. CONTRACTOR shall submit to OWNER's representative the proposed installation and alignment tool for approval. Upon approval, CONTRACTOR shall procure a sufficient number of these tools to use in the installation process. No light base or light shall be installed without using an approved installation and alignment tool. All alignment tools shall be turned over to Airport Electrical Maintenance when the project is complete.

850-1.7 SHOP DRAWINGS AND MATERIAL LISTS. Shall be in accordance with Item L-100, Paragraph 100-1.6, for the following equipment:

a. L-852A (bi-directional, narrow beam), Style 3 light fixture.

b. L-852K (bi-directional, wide beam), Style 3 light fixture.

c. L-830 Isolation transformers.

d. Installation tools and details.

850-1.8 TESTING. Refer to Item L-100 for tests of applicable equipment.

MATERIALS

850-2.1 GENERAL. Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20590, and shall be listed in Advisory Circular 150/5345-53A, Airport Lighting Equipment Certification Program. All in-pavement lights shall meet the requirements of AC 150/5345-46.

850-2.2 FLUSH IN-PAVEMENT TAXIWAY LIGHT FIXTURES. . Types L-852A (narrow beam with green or yellow optical system as indicated on the plans), L-852K (wide beam with green or yellow optical system as indicated on the plans) meeting the requirements of FAA AC 150/5345-46. Lamps shall be 6.6 amp type.

Fixtures shall be suitable for use with 6.6 amp secondary circuits and mount on a 12-inch diameter (Size B) L-868 base can. The reveal above the adjacent pavement surface shall not exceed 0.25-inch. Provide with grounding lug (see Plans).

850-2.3 LIGHT BASE. Light base shall be under Item L-867/868. All bases shall be provided with anti-rotational devices. Provide with grounding lug as shown on the drawings.

850-2.4 TAXIWAY IN-PAVEMENT LIGHT ISOLATION TRANSFORMER. Type L-830, 6.6A, 60 hertz, of the appropriate wattage for the type of associated fixture per manufacturer's recommendation, meeting the requirements of FAA AC 150/5345-47.

850-2.5 HARDWARE. All bolts, nuts, washers and lockwashers shall be stainless steel. Install using high temperature anti-seize compound.

850-2.6 CABLE. See Item L-108. Type L-824C, 5 kV, and 600 V, meeting the requirements of FAA AC 150/5345-7. The 600V cable for the secondary between the in-pavement fixture, the control module and isolation transformer shall be incidental to, and integral with, the control module and the L-830 isolation transformer.

850-2.7 PLUG AND RECEPTACLE CABLE CONNECTORS. Type I, Class A, meeting the requirements of FAA AC 150/5345-26. Also see Item L-108.

850-2.8 CONCRETE. Concrete for backfill shall conform to the requirements of Item P-610 Structural Portland Cement Concrete (4,000 psi).

850-2.9 GROUT AND SEALANT. Filling/sealing grout used to encase in-pavement transformer/light bases in concrete shall meet FAA Specification P-606 and shall be a two-component

liquid, rapid curing, stress-relieved epoxy adhesive for use in waterproofing nonmoving joints in Portland cement concrete pavement. Filling/sealing sealant used to encase in-pavement transformer/light bases in asphalt shall meet FAA Specification P-606 and shall meet the requirements of ASTM D 3405, Joint Sealants, hot poured for bituminous pavements, and applicable section(s) of FAA Specification Item P-606. Each lot or batch of sealing compound shall be delivered to the job site in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this specification.

Prior to application the exposed surfaces of the hole-saw cut shall be sand blasted to a clean, rough surface finish to assure adequate bond between the grout and the Portland cement concrete pavement.

METHOD OF MEASUREMENT

850-3.1 SALVAGE AND REINSTALL IN-PAVEMENT TAXIWAY FIXTURES. The quantity to be measured shall be for the salvage and reinstallation of the existing flush in-pavement taxiway lights on new or existing bases with isolation transformers, connectors, lighting cable, in accordance with the Plans and Specifications and as accepted

850-3.2 NEW IN-PAVEMENT TAXIWAY LIGHTS. Payment for the installation of new flush taxiway lights shall be made at the contract unit price for furnishing and installing each type of fixture. The unit price shall be full compensation for all labor, materials, equipment, testing and incidentals necessary to complete the Item as accepted by the Owner.

BASIS OF PAYMENT

850-4.1 SALVAGE AND REINSTALL IN-PAVEMENT TAXIWAY FIXTURES. Payment for the salvage and reinstallation of existing flush taxiway lights shall be made at the contract unit price for installing said lights. The unit price shall be full compensation for furnishing all materials and for all preparation, erection and installation of these materials to complete the item

850-4.2 NEW IN-PAVEMENT TAXIWAY LIGHTS. This Item shall consist of the installation of each new flush in-pavement taxiway centerline fixtures with appurtenances (isolation transformer with secondary cable assembly), on a modified existing base or on a new base (under Item L-867/L-868: including light base, flange ring, spacer, counterpoise loop and ground rod). Work shall include connections and testing in accordance with the plans and specifications and as accepted by the Owner.

Payment will be made under:

Item L-852-4.1	Salvage and Reinstall L-852A Taxiway Centerline Light with New Isolation Transformer on New or Existing Base – Per Each
Item L-852-4.2	New L-852A Taxiway Centerline Light with New Isolation Transformer on New or Existing Base – Per Each
Item L-852-4.3	New L-852K Taxiway Centerline Light with New Isolation Transformer on New or Existing Base – Per Each

REFERENCED PUBLICATIONS

850-5.1 FAA SPECIFICATIONS REFERENCED IN L-852 All references shall be current edition.

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connections
AC 150/5345-42	Specification for Light Base and Transformer Housings, Junction Boxes and Accessories (including Change 1)
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program (including Change 1)

END OF ITEM L-852

ITEM L-858(L) AIRPORT GUIDANCE LIGHTING SYSTEMS (SIGNAGE)

DESCRIPTION

858-1.1 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions apply to work specified in this Item.

858-1.2 GENERAL. This Item shall consist of internally lighted airport guidance signage furnished and installed in accordance with this specification, the referenced specifications, the manufacturer's recommendations, and the applicable codes, standards and Advisory Circulars. The signs 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 Engineer.

858-1.3 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 six (6) copies of manufacturers' brochures containing complete dimensional and performance characteristics, installation and operation instructions, etc., for the following equipment: This list shall include the name of each item, the Federal Aviation Administration specification number, the manufacture's name, the manufacturer's catalog number, and the size, type and/or rating of each item.

a. Shop drawings shall be submitted showing:

(1) Installation requirements (i.e., foundation size, anchor bolt location, etc.);
(2) Dimensioned and detailed pre-cast or cast-in-place concrete bases foundations;
(3) Isolation transformer sized appropriately per manufacturer's requirements for sign configuration and type;
(4) Steel L-867 base and steel cover (transformer enclosure.).

b. Catalog cuts shall be submitted showing:

(1) Sign schedules including sign numbers and face panel descriptions;
(2) Message layout for each sign;
(3) Sign and sign base (features and accessories, installation details);
(4) Sign assembly, including fabrication assembly and internal and external wiring diagrams;
(5) Wind load and frangibility load ratings;
(6) Load data for all brightness steps, as measured from the primary side of the isolation transformer;
(7) Power factor;
(8) Lamp life;
(9) Manufacturer's statement of warrantee (see paragraph 858-2.8 b).

In addition to the above specific items, 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.

The submittal shall be complete and made in one submission in booklet form with hard-bound cover. Partial submissions will not be reviewed or considered.

858-1.4 MATERIAL DELIVERY SCHEDULE AND REQUIREMENTS. All signs and associated materials (transformers and connecting cables, transformer housings, anchor bolts, floor flanges, breakable couplings, and incidental mounting hardware), for the project shall be procured under this contract in accordance with the material delivery directed by the Engineer. The following material distinction is made to define the material to be delivered:

a. Mounting Hardware. Mounting hardware shall include detailed installation shop drawings as prepared by the sign supplier and approved by the Engineer, transformer housings, anchor bolts and floor flange templates, and sign markers (blank).

b. Sign. Signs shall include the actual sign to be installed, transformer and connecting cables, floor flanges, breakable couplings, tethers, and all other incidentals necessary to provide a complete and operable sign.

EQUIPMENT AND MATERIALS

858-2.1 GENERAL. Taxiway guidance signs, hereinafter referred to as "Signs," shall be retroreflective and shall be the internally illuminated, non-fiber optics type, conforming to AC 150/5345-44, other referenced publications, and to the requirements of this Section. LED signs shall also conform to FAA LED “Engineering Brief No. 67” (current edition). In the event of conflict, the more stringent of these shall apply. The signs shall have a record of having operated successfully for a minimum period of one year at an airport located in the continental United States. The sign manufacturer shall have minimum five years experience in the manufacture of lighted airfield signs to FAA requirements.

Airport signage equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20591, and shall be listed in Advisory Circular 150/5345-53A, Airport Lighting Equipment Certification Program.

All other equipment and materials covered by other referenced specifications shall be subject to acceptance through the manufacturer's certification of compliance with the applicable specifications and subject to Owner's approval.

Lists of the equipment and materials required for a particular system are contained in the applicable Advisory Circulars.

858-2.2 SIGN CLASSIFICATION. The classification of each sign shall be as shown on the Construction Drawings and as specified below:

a. Types. Signs of the following types are included:

(1) Type L-858Y(L). Direction, Destination, and Boundary Sign. Black legend on a yellow background.

(2) Type L-858L(L). Taxiway Location Sign. Yellow legend and border on a black background.

(3) Type L-858R(L). Mandatory Hold Sign. White legend and border on a red background.

b. Sizes. Signs of the following sizes are included:

(1) Size 3**.** 30-inch (760 mm) sign face with a 18-inch (460 mm) legend

c. Styles. Signs of the following styles are included:

(1) Style 2. Powered from a three-step series lighting circuit (4.8-6.6 amperes)

(2) Style 3. Powered from a five-step series lighting circuit (2.8-6.6 amperes)

d. Classes. Lighted signs of the following classes are included:

(1) Class 1. For operation down to -4 degrees C.

e. Modes. Unlighted signs of the following modes are included:

(1) Mode 2. To withstand wind loads of 200 mph.

(2) Mode 3. To withstand wind loads of 300 mph where indicated in Fixture Schedule tables on the E2 Series drawings.

858-2.3 EQUIPMENT TO BE SUPPLIED. The sign shall be complete in accordance with all specification requirements and shall include mounting legs and hardware, electrical disconnect, any required series circuit adapter unit, and an instruction booklet.

858-2.4 ENVIRONMENTAL REQUIREMENT. The signs, including all required components, shall be designed for continuous outdoor use under an ambient temperature range from -20 degrees C to +55 degrees C. The signs shall be capable of withstanding wind velocities up to 200 mph and exposure to driving rains.

858-2.5 CONSTRUCTION FEATURES.

a. Sign Construction.

(1) Signs shall be constructed of light weight, nonferrous materials, and shall be designed for installation on a concrete pad foundation. All required mounting hardware, except anchor bolts, shall be supplied with the sign. Loose parts shall be tethered to, or otherwise prevented from blowing away from, the installed sign enclosure. All screws or latches shall be the captive type, and shall be easy to open and close.

(2) The LED L-858 sign light source shall utilize individual Light Emitting Diode (LED) light tube assemblies. The design of the LED electronics must insure sign lumen maintenance of 70% (L70) minimum for greater than 10 years (assuming sign operates an average of 12 hours per day). A FAA L-858 sign must maintain constant brightness at all CCR step settings.

(3) Signs shall be compatible with all existing associating lighting elements (regulators, lights, signs, etc.) on the airfield. Compatibility shall include not causing detrimental effects to the existing airfield lighting elements or not demonstrating detrimental effects due to connection to existing airfield lighting. This compatibility shall be part of the guarantee for the product and any corrective action required shall be at the sole expense of the Contractor.

(4) Mounting legs for each sign shall have frangible points located 2 inches or less above the concrete pad foundation. The frangible points shall withstand the required wind loads due to jet blast of 200 or 300 mph, as scheduled on the Fixture Schedule tables on the E2 Series drawings. Legend panels and panel supports shall withstand, at a minimum, the pressure at which the frangible points break. A production sample of two-module sign of proposed signs shall be tested using an inflatable air bag to verify conformance to the strength requirements herein and FAA AC 150/5345-44. There shall be no permanent deformation to the sign body or face as a result of the test. The strength tests shall be certified by the manufacturer.

(5) Taxiway signs on taxiway edge light circuits shall be Size 3, Style 2 (three step). All signs in runway edge light circuits shall be size 3, Style 3 (five step).

(6) Signs shall have legends on one or both sides, as scheduled on the Drawings. The sign face shall comply with paragraph 126-3.7. The sign face assembly shall have gasketing between the sign material and housing.

(7) The color of the sign enclosure shall be black. Reflective material shall be applied to the sides of the sign (and back if blank) such that the sign will be visible to vehicles during the hours of darkness.

(8) The sign shall be completely sealed against sand and dust so that all internal surfaces will remain bright and clean. The lamp(s) shall be easily changeable and all electrical control equipment shall be easily accessible.

b. Tether. Each sign shall be supplied with a minimum of two tethers, with not less than two tethers per five sign legs. The tethers shall be installable such that each sign, when knocked down by a wind of greater than 200 mph, shall remain attached to the sign foundation. Tethers shall be 1/8" stainless steel aircraft cable and shall be secured to the sign enclosure and to a support leg base flange anchor bolt with lock nuts and large diameter washers.

c. Electrical Features.

(1) The signs shall be relampable without the use of tools. Loose parts shall be tethered to, or otherwise prevented from blowing away from, the installed sign enclosure. All screws and latches shall be the captive type.

(2) Power input from the lighting circuit shall be made through an isolation transformer conforming to AC 150/5345-47.

(3) Power input leads shall be at least two feet in length and shall allow for lead termination in a Type 1, Class A, Style 9 receptacle conforming to AC 150/5345-26.

(4) For LED signs, the sign shall impose a low load (VA) on 3-step, 5-step or 5.5A (1-step) constant current regulators using an internal LED power supply circuit contained on one module located inside of the sign. To maximize maintenance personnel safety, there shall be no more than 240Vdc at any point inside the sign. Isolation transformer secondary power wiring shall be routed through the sign leg. The internal LED power supply circuit shall not require field calibration. The LED L-858B sign shall have an input Power Factor >0.82 as measured on the primary of the L-830 or L-831 isolation transformer. Both the fixture input maximum VA load and the maximum CCR load

shall be shown on the catalog sheet included with the submittal documents. The electrical design of the sign shall insure conformance with FAA AC 150/5345-44, par. 3.2.5.7. This paragraph states: "The failure of any light source within a sign must not result in a potential miscommunication of the intended message to a pilot. If the failure of an internal lamp(s) in a sign causes a panel or any section of a panel to be dark, or have an average luminance less than the minimum required in paragraph 3.2.5.6, sign operation must be automatically discontinued."

(5) All wiring shall conform to the requirements of NFPA 70. All wiring shall be color-coded and shall be clearly labeled. There shall be no exposed wiring, except for the power cord.

(6) All electrical materials and equipment for which there is a nationally recognized standard shall bear the conformance labeling of the third party inspection authority, such as Underwriters Laboratories, Inc., Factory Mutual, or ETL.

d. Photometrics and Lamp Features.

(1) The ratio of the maximum reading of the light across the face of the signs to the minimum reading of the light output across the face of the signs shall not exceed the value of 5:1.

(2) Type R signs: The ratio of average luminance between message (white) and background (red) shall be not more than 10:1 and not less than 5:1.

(3) Manufacturer shall provide the minimum service life for the lamps in the signs when the sign is operational at its highest step.

(4) Manufacturer shall provide minimum time between failures (MTBF) for

- Lamps in the signs.
- Sign intensity control mechanisms

858-2.6 ELECTRICAL DISCONNECT.

a. All signs shall be equipped with a power input disconnect cable terminated with a Type II plug, conforming to the requirements of the latest edition of FAA AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors. The length of this cable shall permit the plug end to reach at least 6 inches below the top of the concrete pad on which the sign is mounted. A cable clamp or similar restraining device shall be provided in the sign to prevent strain on the cable terminal connections when the cable plug is pulled apart.

b. An external electrical disconnect switch shall be included in each sign assembly. This switch, when activated, shall de-energize the sign for relamping purposes while maintaining continuity of the series lighting circuit.

c. SIGN SIZES. The heights of the signs shall be in accordance with the dimensions as follows:

SIZE	LEGEND HEIGHT	LEGEND PANEL HEIGHT	OVERALL MOUNTING HEIGHT
	(Inches)	(Inches)	(Inches)
3	18	30	36 - 42

The lengths of the signs shall be determined by the message to be conveyed, but shall not exceed the maximum length specified by Table 1 of AC 150/5345-44.

858-2.7 SIGN FACES.

a. The signs shall be either single face (message only on one side) or double face (messages on two sides). The spacing, stroke, shape of legend characters, numerals, symbols, border for Type L-858L(L) sign faces, and message dividers shall be in accordance with FAA AC 150/5345-44.

b. Contractor and Manufacturer shall provide a warranty for a minimum of three years against the delamination of the surface films from the face of the signs.

858-2.8 PERFORMANCE REQUIREMENTS.

a. Sign Operation.

(1) Signs shall be energized and operated at any incoming current value of the series lighting circuit without flickering.

(2) The luminance level and uniformity of the sign shall be maintained across all series lighting circuit current values, as measured from the primary side of the isolation transformer.

(3) Power input from the series lighting circuit shall be made through isolation transformers, properly rated, and conforming to AC 150/5345-47.

(4) Minimum rated operating lamp life, when sign is operated at the highest intensity step, shall not be less than 9,000 hours.

b. Sign Luminance and Color.

(1) The internally illuminated background of the Type L-858Y(L) sign and the legend of the Types L-858R(L) and L858L(L) signs shall have an average luminance from 10 to 30 footlamberts, with 16 to 30 footlamberts at the 2 highest intensity steps (white or yellow).

(2) The internally illuminated message of Type L-858B(L) signs shall have a luminance from 29 to 88 foot-lamberts.

(3) The message of the sign shall be readily identifiable up to a distance of 800 feet when viewed during the day or when lighted at night. Uniformity shall be kept as defined in FAA AC 150/5345-44.

(4) The sign shall have a uniformity ratio no greater than 5:1 for luminance measured at any 3-inch grid on the sign for a specific color, and no more than 1.5:1 for luminance measured at any adjacent 3-inch grids.

(5) Contractor shall provide a warranty on the retroreflective material lamination process (paragraph 858-2.8 b.).

858-2.9 FINISH. External surfaces of the signs, excluding the mounting legs and face panel, shall be painted with a primer coat and a low luster, black finish coat. The surface color treatment of the nonmetallic surfaces shall be equal in quality to that obtained on metal surfaces.

858-2.10 NAMEPLATE. Each sign shall have a nameplate giving the Sign Name as shown on the Construction Drawings, Type, Size, Style, Class, manufacturer's name, address, catalog number, and lamp data, including type and rating. The nameplate on Style 2, 3, and 5 signs shall give the total maximum volt-amp load and power factor as seen from the primary of the isolation transformer. The total maximum volt-amp load indicated shall reflect the highest possible volt-amp loading on the regulator and shall include loading due to a "worst case" isolation transformer, and any required ballast and/or adaptor units. The nameplate shall be mounted to the exterior of the sign enclosure at the top side of the sign.

858-2.11 WORKMANSHIP. The equipment shall be fabricated in accordance with the highest quality workmanship. All wiring shall be neatly run and laced. All sharp edges and burrs shall be removed. Painted surfaces shall be free from runs, blotches, and scratches.

858-2.12 INSTRUCTION BOOKLET. Ten (10) copies of an instruction booklet shall be included with each order of signs, which shall include installation instructions, maintenance procedures (including operating voltage and point readings), and a complete parts list, including recommended spare parts list. It shall also describe the lamp wattage or current needed to maintain the luminance levels specified herein.

858-2.13 SIGN COVER. Sign covers shall be capable of fully covering the sign and withstanding the weather conditions and jet blast to which it may be subjected during its installation. The material shall be sufficiently heavy (similar to canvas) to completely obscure the sign message so that it cannot be read.

858-2.14 SPARES. New installations shall include 100 percent spare lamps, frangible legs, ballasts and PCB power supply units and shall be furnished to airport maintenance.

858-2.15 ISOLATION TRANSFORMER. An isolating transformer shall be provided with each signs and shall conform to the requirements of the applicable Advisory Circular. Provide with extended secondary connector cable kit. Transformers shall be minimum sized per manufacturer’s requirements. Isolation transformer shall conform to the latest edition of FAA AC 150-5345-47, Isolation Transformers for Airport Lighting Systems. The isolation transformer shall be an integrated unit, with power input leads at least 24 inches in length - one lead terminating in a Type I, Class A, Style 2 plug and the other lead in a Type I, Class A, Style 9 receptacle, conforming to the latest edition of FAA AC 150-5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors.

CONSTRUCTION METHODS

858-3.1 GENERAL. The installation and testing details for the systems shall be as specified in the applicable Advisory Circulars.

858-3.2 PHASING AND INTERRUPTIONS. The construction phasing and airfield operational requirements for this project may require that new signs are installed, tested, switched to OFF, and covered until directed by the Resident Engineer (RE) to activate the signs. Activating the signs will be done as directed by the RE.

858-3.3 LOCATION/ELEVATION. The signs shall be installed at the locations indicated in the plans. Guidance signs shall be located where indicated on the sign data tables in the plans. Longitudinal tolerance is ±1'-0". Foundation elevation shall be 1 to 2 inches above finish grade as established on the civil grading and drainage drawings.

858-3.4 TRANSFORMER. The transformer shall be installed in the L-867 base at location and position as indicated on the plans. The primary cable connections shall be made by use of the L-823 plug and receptacle cable connectors and with heat-shrinkable sleeves over the connectors.

858-3.5 HARDWARE. All bolts, nuts, washers and lockwashers shall be stainless steel. Install using anti-seize compound.

858-3.6 CABLE, CONNECTOR, AND ISOLATION TRANSFORMERS. The primary and secondary cable leads of the transformers are supplied with factory-installed molded connectors. Visual inspection of these items during installation is very important. Minor cuts, bruises, or mishandling may result in progressive deterioration which will eventually cause complete failure, but not until some time after acceptance tests. During installation, these items shall be inspected for the following:

a. The mating surfaces of molded connectors are clean and dry when plugged together. If clean and dry inside, these high voltage connectors, with taping, form a connection equal or superior to a conventional high voltage splice. Conversely, if they are wet or dirty no amount of taping can produce a satisfactory connection. Two or three turns of tape should be used to hold the connector together and keep the parting line clean. Cleanliness of mating surfaces can be ensured by keeping the factory-installed caps in place until the final connection is made. The mating surfaces of uncapped connectors should not be laid down, touched, or breathed upon. If a connection must be broken, the connectors should be immediately capped.

b. The connectors are completely plugged together. After initial plugging, trapped air pressure may partially separate the plug and receptacle. If this happens, wait a few seconds and push them together again. Two or three turns of tape should be used to hold them in place.

c. The cables are not cut by shovels, kinked, crushed by vehicle wheels bruised by rocks, or damaged in any way during handling and installation.

d. The cables do not directly cross each other and are separated by the specified distance.

e. The cables are not bent sharply where they enter (or leave) a conduit, and are supported properly by tamped ground so future settling will not cause sharp bends.

858-3.7 IDENTIFICATION NUMBERS. An identifying number shall be assigned to each sign in accordance with the drawings. The placing of these numbers shall be accomplished by use of 2-inch

diameter nonferrous metal tag, with the numerals approximately 1/4-inch in height, stamped in, embedded in the concrete base as detailed on the drawings, so each faces the taxiway or runway.

858-3.8 FIELD TESTS AND INSPECTIONS

a. Contractor shall provide the RE ten (10) working days notice prior to test(s). All deficiencies found shall be corrected and tests repeated.

b. **Operation.** Upon completion of all the tests required under other sections, the Contractor shall show by in-service demonstration that all circuits, control equipment, and all lights covered by the contract are in good operating condition. The testing of each circuit shall be made using local control switches on the regulators in each lighting vault. Each switch shall be operated so that each switch position is engaged at least five times. During this process, all lights and associate equipment shall be observed to determine that each circuit operates properly. Telephone or radio communication between the operator and the observers shall be provided. The above tests shall be repeated from the alternate control station, from the remote control points, and also again from the local control switches on the regulators. Each lighting circuit shall be tested by operating the lighting circuits at each brightness step. Visual examination shall be made at the beginning and at the end of this test to determine that the correct signs are energized.

c. **ELECTRICAL TESTS ON CABLES**. See Item L-108.

METHOD OF MEASUREMENT

858-4.1 NEW L-858(L) SIGNS ON NEW FOUNDATIONS. Payment for the installation of new signs shall be made at the contract unit price for furnishing and installing each configuration of sign. The unit price shall be full compensation for all labor, materials, equipment, testing and incidentals necessary to complete the Item as accepted by the Owner. Payment for the furnishing and installing of the concrete sign foundation shall be paid under L-867/868 bid item for each configuration of sign.

858-4.2 NEW L-858(L) SIGNS ON NEW PCC PAVEMENT. The quantity of each new sign shall include: Furnishing each new L-858 sign, with lamps and transformer, mounting supports and hardware; furnishing and installing a new L-868 Type I base in new PCC Pavement where indicated, including conduits to sign and stub out from base; and wiring of sign with new L-823 connectors with heat-shrinkable rubber sleeve over the connectors. Installed as completed unit, connected to circuit, operating for a minimum of one-week burn-in period, ready for operation and accepted.

858-4.3 NEW L-858(L) SIGNS ON EXISTING PCC PAVEMENT. The quantity of each new sign shall include: Furnishing each new L-858 sign, with lamps and transformer, mounting supports and hardware; furnishing and installing a new L-868 Type I base in existing PCC Pavement where indicated, including core drilling for L-868 base, sawcutting and trenching for conduits to sign foundation; and wiring of sign with new L-823 connectors with heat-shrinkable rubber sleeve over the connectors. Installed as completed unit, connected to circuit, operating for a minimum of one-week burn-in period, ready for operation and accepted

BASIS OF PAYMENT

858-5.1 NEW L-858(L) SIGNS ON NEW FOUNDATIONS. This Item shall consist of the installation of each new sign which shall include: Furnishing and installing each new L-858 sign, with lamps and transformer, mounting supports and hardware. Work shall include connections and testing in accordance with the plans and specifications and as accepted by the Owner. The unit price of each of these items shall also include the Contractor's overhead, profit and markup.

858-5.2 NEW L-858(L) SIGNS ON NEW PCC PAVEMENT. Payment for the installation of new internally lighted retroreflective signs on new PCC Pavement shall be made at the contract unit price for furnishing and installing each configuration of sign. The unit price shall be full compensation for all labor, materials, equipment, testing and incidentals necessary to complete the Item as accepted by the Owner.

858-5.3 NEW L-858(L) SIGNS ON EXISTING PCC PAVEMENT. Payment for the installation of new internally lighted retroreflective signs on existing PCC Pavement shall be made at the contract unit price for furnishing and installing each configuration of sign. The unit price shall be full compensation for all labor, materials, equipment, testing and incidentals necessary to complete the Item as accepted by the Owner.

Payment will be made under:

Item L-858-5.1	New Size 3, 1-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly – per each
Item L-858-5.2	New Size 3, 2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly – per each
Item L-858-5.3	New Size 3, 3-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly – per each
Item L-858-5.4	New Size 3, 4-Module Airside LED Guidance Sign Installed on Any Foundation or Base Assembly – per each
Item L-858-5.4	New Size 3, 3+2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly – per each
Item L-858-5.7	New Size 3, 4+2-Module Airside LED Guidance Sign, Installed on Any Foundation or Base Assembly – per each

REFERENCED PUBLICATIONS

858-6.1 FEDERAL SPECIFICATIONS REFERENCED IN ITEM L-858.

WW-C-581	Conduit, Metal, Rigid; and Coupling, Elbow; and Nipple, Electrical Conduit: Zinc-Coated
W-C-1094	Conduit, Plastic-Type II Schedule 40

858-6.2 FAA SPECIFICATION REFERENCED IN L-858. All references are current edition.

AC 150/5340-18	Standards for Airport Sign Systems
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors (including Changes 1 & 2)
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes and Accessories (including Changes)
AC 150/5345-44	Specification for Taxiway and Runway Signs
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program

END OF ITEM L-858

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ITEM L-861T ELEVATED MEDIUM INTENSITY TAXIWAY EDGE LIGHTS

DESCRIPTION

861T-1.1 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions apply to work specified in this Item.

861T-1.2 GENERAL. This Item shall consist of the following installations and material:

a. Furnishing and installing new L-861T(L) medium intensity taxiway edge lights (MITL), and isolation transformers in accordance with these specifications and at the locations shown on the plans. Installation or modification of L-867 and L-868 bases shall be covered under Section L-867/868.

b. Furnishing and installing new blue taxiway edge light globes in accordance with these specifications and at the locations shown on the plans.

c. Providing spares with isolation transformer and cable connector kits in shipping packaging, delivered to the Owner at the Airport maintenance shop.

861T-1.3 APPLICABLE DOCUMENTS. The publications listed at the end of this Item are incorporated herein by reference and form a part of this Item to the extent indicated by the references thereto. Except where a specific date is given, the issue in effect (including amendments, addenda, revisions, supplements, and errata) on the date of this solicitation shall be applicable. In the text of this Item, such publications are referred to by basic designation only. Additional details and specifications pertaining to a specific system are contained in these documents and are to be considered as part of this Item. Perform all work in accordance with these documents except as specified herein. In the event of a conflict between contract documents and the referenced documents, the more stringent rule shall be applied.

861T-1.4 IDENTIFICATION NUMBERS. An identifying number shall be assigned to each permanent light in accordance with the drawings. The placing of these numbers shall be accomplished by use of 2-inch diameter nonferrous metal tag, with the numerals approximately 1/4-inch in height, stamped in, embedded in the concrete base as detailed on the drawings, so each faces the nearest point on the taxiway centerline.

861T-1.5 SHOP DRAWINGS AND MATERIAL LISTS. Shall be in accordance with Item L-100, Paragraph 100-1.6, for the following equipment:

a. L-861T(L) Light fixture.
b. L-830 Isolation transformer.
c. L-823 Cable connector.

861T-1.6 LOCATION/ELEVATION. New lights shall be spaced on centers as indicated on the drawings. Longitudinal tolerance is +/- 6 inches.

Elevation of bases shall be coordinated with the existing grade. The base shall be set so that the light fixture base plate shall be within +1 to +2-inch of the finished grade.

MATERIALS

861T-1.7 GENERAL. Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20590, and shall be listed in Advisory Circular 150/5345-53, Airport Lighting Equipment Certification Program, current edition.

861T-1.8 MEDIUM-INTENSITY ELEVATED TAXIWAY LIGHT FIXTURES. Type L-861T(L), LED, omni-directional, meeting the requirements of FAA AC 150/5345-46, current edition. Lights shall have blue optical systems. Installed height to top of globe shall be 14 inches above base.

861T-1.9 LIGHT BASE. Type L-867, Size B, two-piece or extension type light base and base plate shall be under Item L-867/868. Provide with grounding lug as shown on the drawings.

For installation in PCC, Type L-868, Size B, two piece light base and base plate shall be under Item L-867/868. Provide conversion ring from L-868 bolt pattern to L-867 bolt pattern. Provide with grounding lug as shown on the drawings.

861T-1.10 ISOLATION TRANSFORMER. Type L-830, 10/15 watts, 60 hertz, meeting the requirements of FAA AC 150/5345-47, current edition.

861T-1.11 HARDWARE. All bolts, nuts, washers and lock washers shall be stainless steel. Install using anti-seize compound.

861T-1.12 PLUG AND RECEPTACLE CABLE CONNECTORS. L-823, Type I, Class A, meeting the requirements of FAA AC 150/5345-26, current edition.

861T-1.13 CONCRETE. Concrete for foundations shall conform to the requirements of Item P-610 *Structural Portland Cement Concrete.*

METHOD OF MEASUREMENT

861T-2.1 NEW ELEVATED TAXIWAY EDGE LIGHTS. Payment for the installation of new elevated medium intensity taxiway edge lights shall be made at the contract unit price for furnishing and installing each fixture. The unit price shall be full compensation for all labor, materials, equipment, testing and incidentals necessary to complete the Item as accepted by the Owner.

861T-2.2 SPARE ELEVATED TAXIWAY EDGE LIGHTS. Payment for spare fixtures shall be made at the contract unit price for each spare fixture with appurtenances delivered to the Owner's maintenance shop. The unit price shall be full compensation for all labor, materials, equipment, and incidentals necessary to complete the Item as accepted by the Owner.

861T-2.3 SALVAGE AND REINSTALL RUNWAY EDGE FIXTURE. The quantity to be measured shall be for the salvage and reinstallation of the existing elevated runway lights on new or existing bases with new isolation transformers, connectors, lighting cable, in accordance with the Plans and Specifications and as accepted

BASIS OF PAYMENT

861T-3.1 NEW ELEVATED TAXIWAY EDGE LIGHTS. This Item shall consist of the installation of each new elevated medium intensity taxiway edge light fixture with appurtenances (base plate, stem, frangible coupling and isolation transformer with secondary cable assembly), on an existing base or on a new base (under Item L-867/L-868: including light base, safety ground and ground rod). Work shall include connections and testing in accordance with the plans and specifications and as accepted by the Owner.

861T-3.2 SPARE ELEVATED TAXIWAY EDGE LIGHTS. This Item shall consist of furnishing each spare elevated medium intensity taxiway edge light fixture with appurtenances (base plate, stem, frangible coupling, isolation transformer with secondary cable assembly and splice kit) delivered to the Owner's maintenance shop.

861T-3.3 SALVAGE AND REINSTALL RUNWAY EDGE FIXTURE. Payment for the salvage and reinstallation of existing elevated runway lights shall be made at the contract unit price for installing said lights. The unit price shall be full compensation for furnishing all materials and for all preparation, erection and installation of these materials to complete the item

Payment will be made under:

Item L-861T-4.1	New L-861T(L) LED Taxiway Edge Light with New Isolation Transformer on New or Existing Base - per each
Item L-861T-4.2	Spare L-861T(L) Taxiway Edge Light with New Isolation Transformer - per each
Item L-861T-4.3	Salvage and Reinstall existing L-862 Runway Edge Light with New Isolation Transformer on New or Existing Base - per each

REFERENCED PUBLICATIONS

861T-4.1 FAA SPECIFICATIONS REFERENCED IN L-861T. All references shall be current edition.

AC 150/5340-30	Design and Installation Details for Airport Visual Aids
AC 150/5345-26	Specification for L-823 Plug and Receptacle, Cable Connectors (including Changes 1 & 2)
AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes and Accessories (including Changes)
AC 150/5345-46	Specification for Runway and Taxiway Light Fixtures
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
AC 150/5345-53	Airport Lighting Equipment Certification Program

END OF ITEM L-861T

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ITEM L-867/868 LIGHT BASE AND TRANSFORMER HOUSING

DESCRIPTION

867/868-1.1 RELATED DOCUMENTS. The General Provisions of the Contract, including General and Special Conditions apply to work specified in this Item.

867/868-1.2 GENERAL. Elements under this Section shall consist of bases and/or appurtenances for the following work:

- **a.** L-867 bases and covers for use for miscellaneous system cable splices.
- **b.** L-867 bases and appurtenances for any Elevated Fixture (Runway and Taxiway Edge Lights, Runway Guard Lights).
- **c.** L-868 bases and appurtenances for any In-pavement Fixture (Taxiway Centerline Lights, Runway Edge Lights, Runway Guard Lights).
- **d.** Installation methods for L-868 base shall include the following options:

    (1) "Standard" two-step installation (base and appurtenances (grounding, rebar cage, etc.) set in concrete, plus shallow core drill for extension to final grade).
    (2) Either of two "Core Drill" installations (full depth core drill with concrete in-fill) for fixtures at paving lane or saw cut joints.
    (3) The "Diamond Leave-out" installations (form around base location with concrete in-fill) at intersections of paving lanes and saw cut joints where fixture cannot be moved far enough to avoid the intersection.

- **e.** Blank covers for vacated existing L-867 bases.
- **f.** Aircraft load rated blank covers for new or vacated existing L-868 bases.
- **g.** Guidance sign foundations (sign installation is under Item L-858).

867/868-1.3 SHOP DRAWINGS AND MATERIAL LISTS. Shall be in accordance with Item L-100, Paragraph 100-1.6, for the following equipment:

- **a.** Bases, extensions, rings and adaptor rings.
- **b.** Flange Rings.
- **c.** Blank cover plates.

867/868-1.4 LOCATION/ELEVATION. Bases shall be located as indicated on the drawings.

Elevation of in-pavement bases shall be coordinated with the civil grading and drainage drawings per the requirements of Item L-850.

Elevation of in asphalt shoulder bases shall be coordinated with the civil grading and drainage drawings per the requirements of Item L-862 and Item L-861T.

867/868-1.5 LIGHT BASE AND LIGHT INSTALLATION ALIGNMENT TOOL. The tolerance requirement for location, elevation, and orientation of all light fixtures is of critical importance and must be maintained. In order to do so the light bases and lights shall be installed using an installation and alignment tool. This tool shall be capable of achieving the final alignment specified and shall be of sufficient strength to support the light base during placement and compaction of concrete around the base. The Contractor shall submit to the Engineer the proposed installation and alignment tool for approval. Upon approval, the Contractor shall procure a sufficient number of these tools to use in the installation

process. No light base or light shall be installed without using an approved installation and alignment tool.

MATERIALS

867/868-2.1 GENERAL. Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20590, and shall be listed in Advisory Circular 150/5345-53, Airport Lighting Equipment Certification Program, current edition.

867/868-2.2 CONSTRUCTION.

a. Steel shall be used in the construction of L-867 and L-868 bases, extensions, and accessories and shall meet the requirements of ASTM A-36. All welds shall be continuous to provide a watertight enclosure. All bases, sections, and extensions shall meet the test requirements in Sections 868-3.1 to 3.6.

b. Construction of PVC, polyethylene plastic or other non-metallic materials for L-868 and L-867 bases will not be accepted.

867/868-2.3 TOP FLANGE. The dimensions of the flange and its bolt circle shall be as required for the appropriate fixture. The flat surface of the flange shall be installed at an angle of 90 degrees, plus or minus 0.25 degree, to the axis of the cylindrical body. The flange shall be continuously attached to the body to provide a watertight seal.

867/868-2.4 BODY. The dimensions of the base and/or extension shall be as shown on the plans. Two duct couplings or grommets shall be provided and installed near the bottom of the base as shown on the plans. The location and size, as shown on the plans, shall be considered standard. However, the location, number, type, and size of the duct connections can be altered to meet special conditions. Any sharp edges formed on the inside of the bases where duct couplings meet the inside surface of the housing shall be removed to prevent cutting of cable insulation at these points. The length of the body section as shown in the plans shall be considered standard, but the length may vary to meet special conditions. Extensions may vary in height as required to the closest 1/16 inch.

L-868 bases and extensions shall be provided with anti-rotational lugs and/or fins welded to the steel body prior to galvanizing.

867/868-2.5 L-867 LIGHT BASE ASSEMBLY. Type L-867, Size B, two-piece or extension type, meeting the requirements of FAA AC 150/5345-42. Refer to Item L-867/868 for base and base plate specifications. Provide with grounding lug as shown on the drawings.

867/868-2.6 L-868 LIGHT BASE ASSEMBLY. Type L-868, size B, 24-inch-deep, one or two-piece meeting the requirements of FAA AC 150/5345-42, current edition. . Provide with grounding lug as shown on the drawings.

867/868-2.7 FLANGE RINGS, EXTENSIONS, RINGS AND SHIMS. All L-850 type fixtures shall be installed on flange rings (AKA dam ring).

Each L-868 base will be provided with, as indicated, a flange ring and one steel extension ring with appropriate bolt-hole pattern. The Contractor is required to maintain an adequate supply of grade adjustment shims on the project site at all times.

All L-868 bases installed in concrete pavement shall be installed with no more than one spacer ring of a thickness as required to accommodate conduit depths with existing grade.

All L-868 bases installed in asphalt pavement shall be installed with a 6" deep extension and one 1/2-inch spacer ring for adjustment to pavement elevation changes or future mill and overlay construction.

NOTES:

1. Each L-868 base can for L-852 fixtures shall be provided with 12-bolt hole pattern top flange, spacer ring(s) and flange ring.

867/868-2.8 HARDWARE. Bolts and lock washers shall be supplied with each base and extension assembly. The bolts shall conform to dimensions specified in the AC light base manufacturer specifications and shall be fabricated from 18-8 stainless steel. All bolts must be of sufficient length so that a minimum of 2" extends beyond the inside base flange. Install with anti-seize compound.

867/868-2.9 "MUD" COVERS. Plywood protection and installation covers shall be fabricated according to the details and dimensions compatible with bases to be installed. The covers shall be fabricated from exterior grade plywood or a material of equal strength and weather resistance.

867/868-2.10 BLANK COVERS. Blank base covers shall be steel, minimum 3/4-inch thick, with traffic rating of 100,000 pounds. Blank base covers for L-867 bases shall be steel, nominal 1/4-inch thick. Covers used temporarily during construction/paving may be reused in permanent installations at project completion. Any remaining covers shall be turned over to Airport Maintenance at job completion, if requested by the Owner. Otherwise, Contractor shall dispose of all remaining covers off site.

867/868-2.11 GROMMETS. Grommets supplied for duct entrances into bases shall be sized to provide a watertight connection and be made of a material suitable for direct earth burials or encasement by asphalt, Portland cement concrete, or epoxy sealers. The grommet material shall have a hardness of 50 +/-5 as determined by a durometer (ASTM D-2240). Typical grommet details are shown on the plans.

867/868-2.12 GROUNDING LUGS. An internal ground connector shall be supplied with each L-867 or L-868 base and for / on each L-867 fixture base plate (see drawings). For steel bases, a steel lug shall be welded to the interior wall of each base before galvanizing. The details and location of the grounding lug are shown on the plans. The location of the lug may be varied to meet specified conditions. three-hole bronze or copper ground connector shall be fastened to the steel lug after galvanizing.

867/868-2.13 PROTECTIVE COATING. After fabrication, burrs and sharp edges shall be removed, and all metal parts shall be treated for corrosion protection. Prior to tapping operations, all parts of bases, junction boxes, spacer rings in excess of 1/4-inch in thickness, extensions, and conversion rings shall be hot-dip galvanized as specified in ASTM A-386, Class A, and applied in accordance with ASTM A-385. Base flanges, covers, and rings shall be wiped smooth to a flatness of +0.010 inch. Mud plates, grooved spacer rings, and other spacer rings 1/4-inch or less in thickness shall be plated with zinc in accordance with the requirements of Federal Specification QQ-Z-325, Type II, Class 1, or with cadmium in accordance with the requirements of Fed. Spec. QQ-P-416, Type II, Class 1. Tapped holes shall be protected with a polyurethane varnish or equivalent. A zinc dust primer meeting MIL-P-26915 (USAF) shall be permitted for touchup. The area covered by zinc dust primer shall not exceed 10 percent of the total treated area. Any case iron may be coated with a minimum of 2.0 mils of oxyplast powder in lieu of galvanizing.

867/868-2.14 QUALIFICATION TEST. Tests shall be in accordance with FAA AC 150/5345-42C dated 1/4/82.

PREPARATION FOR DELIVERY

867/868-3.1 BASES - PACKING. Each unit shall be individually packed as follows: The flange surface of each light base and transformer housing shall be protected by a cover as described in Paragraph 1.14 herein. A polyethylene gasket of 3-mil thickness shall be placed between the shipping cover and the base flange. The shipping cover shall be bolted to the flange by means of size 3/8, 16 hex-head stainless steel machine bolts seated to 25 inch-pounds of torque. Threaded duct entrances shall be protected with an anti-seize compound and standard thread protectors.

867/868-3.2 BASES - MARKING. Light bases and transformer housing, extensions, and accessories shall be marked for shipment with consignee's name and address, manufacturer's name and address, and other pertinent information as needed by the installer to identify non-standard length bases, special extensions, or other accessories.

CONSTRUCTION METHODS

867/868-4.1 LIGHT BASES. Light bases shall be installed at the locations shown on the plans. The bases shall be installed per the details shown on the plans. The standard base can configuration shall include two drilled openings toward the bottom of the base for the installation of the conduit grommets. The Contractor shall drill, in the appropriate location(s), any additional openings for additional conduit entries. **The equipment ground of Item L-108-3.4 shall be incidental to the installation of each base, light or sign.**

867/868-4.2 CONDUIT CONNECTIONS. Prior to concrete encasement, conduit connections shall be made at the base hubs to form a watertight connection as shown on the plans.

867/868-4.3 EXCAVATION AND BACKFILL. Refer to details on the plans for the various installation configurations. The cover plates shall be visible and free of debris following completion of the backfill.

867/868-4.4 CONCRETE. Concrete for backfill shall conform to the requirements of Item P-610 Structural Portland Cement Concrete (4,000 psi).

867/868-4.5 GROUT AND SEALANT. Filling/sealing grout used to encase in-pavement transformer/light bases in concrete shall meet FAA Specification P-605 and shall be a two-component liquid, resilient and adhesive sealant for use in waterproofing nonmoving joints in Portland cement concrete pavement. Filling/sealing sealant used to encase in-pavement transformer/light bases in asphalt shall meet FAA Specification P-605 and shall meet the requirements of ASTM D 5249, Joint Sealants, for bituminous pavements, and applicable section(s) of FAA Specification Item P-605. Each lot or batch of sealing compound shall be delivered to the job site in the manufacturer’s original sealed container. Each container shall be marked with the manufacturer’s name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer’s certification stating that the compound meets the requirements of this specification.

Prior to application the exposed surfaces of the hole-saw cut shall be sand blasted to a clean, rough surface finish to assure adequate bond between the grout and the Portland cement concrete pavement (PCCP).

METHOD OF MEASUREMENT

867/868-5.1 L-867 OR L-868 BASES. Payment for the installation of new bases for various applications will be paid for at the contract unit price per each type of assembly complete and in place. This price shall be full compensation for furnishing all materials and for all preparation, excavation, concrete, backfilling and placing of the materials; furnishing and installing connections to conduits 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 work.

867/868-5.2 CONCRETE FOUNDATIONS AND BASE ASSEMBLIES FOR SIGNS. The quantity of each new sign foundation shall include: Furnishing and installing a new concrete foundation, L-867 Type I base, conduits to sign and stub out from base; ready for operation and accepted by the Owner. Installation of signs onto concrete foundations shall be incidental to bid items in L-858 for each sign configuration.

BASIS OF PAYMENT

867/868-6.1 SIZE "B" L-867 OR L-868 BASE FOR ANY NEW ELEVATED OR REINSTALLED FIXTURE. This Item shall consist of furnishing and installing, in new shoulder pavement or core drilled in existing shoulder pavement, each new L-867 or L-868 base can per detail 1 on drawing E301, with appurtenances, installation of ground rod, safety ground connections, and testing in accordance with the Plans and Specifications and as accepted by Owner.

867/868-6.2 SIZE "B" L-868 BASE CAN FOR ANY NEW OR REINSTALLED IN-PAVEMENT FIXTURE - "CORE DRILL" INSTALLATION AT JOINT OR SAWCUT. This Item shall consist of the installation of each new L-868 base can per detail 2 on drawing E3.10, with appurtenances, core drilling, concrete encasement, installation of ground rod, safety ground connections, and testing in accordance with the Plans and Specifications and as accepted by OWNER.

867/868-6.3 SIZE "B" L-868 BASE CAN FOR ANY NEW OR REINSTALLED IN-PAVEMENT FIXTURE - "TANGENT CORE DRILL" INSTALLATION AT JOINT OR SAWCUT This Item shall consist of the installation of each new L-868 base can per detail 2 on drawing E3.10, with appurtenances, forming or coring & saw cutting, concrete encasement, installation of ground rod, safety ground connections, and testing in accordance with the Plans and Specifications and as accepted by OWNER.

867/868-6.4 SIZE "B" L-868 BASE CAN FOR ANY NEW OR REINSTALLED IN-PAVEMENT FIXTURE - "DIAMOND LEAVE OUT" INSTALLATION AT JOINT OR SAWCUT. This Item shall consist of the installation of each new L-868 base can per detail 1 on drawing E3.10, with appurtenances, forming, concrete encasement, installation of ground rod, safety ground connections, and testing in accordance with the Plans and Specifications and as accepted by OWNER.

867/868-6.5 CONCRETE FOUNDATIONS AND BASE ASSEMBLIES FOR SIGNS. This Item shall consist of furnishing and installing concrete sign foundations, each with new L-867 base can with appurtenances, installation of ground rod, and testing in accordance with the Plans and Specifications and as accepted by Owner

Payments will be made under:

Item L-867/868-6.1	New Size "B" L-867 Base Can for Any New, Reinstalled or Future Fixture in New Asphalt Shoulder – per Each

Item L-867/868-6.2	Size "B" L-867 Base Can Core Drill in Existing PCCP – per Each
Item L-867/868-6.3	New Size "B" L-868 Base Can with Blank Cover “Standard Installation (New PCCP) – per Each
Item L-867/868-6.4	Size “B” L-868 Base Can – “Standard Installation (New PCCP)” – per Each
Item L-867/868-6.5	Size “B” L-868 Base Can - "Diamond Leave Out” Installation At Joint Or Sawcut – per Each
Item L-867/868-6.6	New Size "B" L-867 Blank Base Can Cover – per Each
Item L-867/868-6.7	New Size "B" L-868 Blank Base Can Cover– per Each
Item L-867/868-6.8	Concrete Foundation for 1-Module Sign – per Each
Item L-867/868-6.9	Concrete Foundation for 2-Module Sign – per Each
Item L-867/868-6.10	Concrete Foundation for 3-Module Sign – per Each
Item L-867/868-6.11	Concrete Foundation for 4-Module Sign – per Each
Item L-867/868-6.12	Concrete Foundation for 4+2-Module Sign – per Each
Item L-867/868-6.13	Sign Base Assembly in New PCCP, Any Single Sign Array – per Each
Item L-867/868-6.14	Sign Base Assembly in Existing PCCP, Any Single Sign Array – per Each
Item L-867/868-6.15	Sign Base Assembly on Existing PCCP, 3+2-Module – per Each

REFERENCED PUBLICATIONS

867/868-7.1 FAA SPECIFICATIONS REFERENCED IN L-867/868. All references are current edition.

AC 150/5345-42	Specification for Airport Light Bases, Transformer Housings, Junction Boxes and Accessories (including Changes)
AC 150/5345-53	Airport Lighting Equipment Certification Program

END OF ITEM L-867/868

DIVISION E

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PART II – TECHNICAL SPECIFICATIONS

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STORMWATER AND OTHER SPECIFICATIONS

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100 MOBILIZATION

100.1. DESCRIPTION:

A. Mobilization shall consist of preparatory work and operations, including but not limited to, installation of staging area temporary utilities, the movement of personnel, equipment, materials, supplies and incidentals to the project site, and for transportation of buildings, Quality Control personnel, laboratory field testing equipment and tools, testing supplies, haul roads and other facilities necessary to complete the Work on the project including providing one or more staging areas with temporary security fence and gate(s). This item is also for the Contractor's operations, and material storage for the Contractor. This item is for other work and operations that the Contractor must perform or costs he must incur before beginning work on the project, and for necessary work and costs in completing the construction and demobilizing from the site.

Demobilization costs may include, but not be limited to, removal of temporary utilities to the staging area and concrete batch plant(s), removal of temporary field offices and materials laboratories, demobilization of equipment, and the clean-up and restoration of the construction staging area, the concrete batch plant(s) and materials laboratories location.

B. Insurance and Bonds shall be purchased by the Contractor and Subcontractors in compliance with Article XI, *Insurance and Bonds* of the General Conditions, and modified in Division B, *Additional Requirements from Aviation Department, Insurance*.

C. Airside Safety and Security / Traffic Control

The airport is operated in strict compliance with Transportation Security Administration (TSA) and 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 sub-contractors will subject the contractor to penalties imposed by the TSA, FAA or San Antonio International Airport (SAIA).

The Contractor shall provide equipment, vehicles and manpower to administer all requirements of the Airport Construction Safety Plan (ACSP) as shown separately and the requirements shown below. 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.

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, installation sequence of underground electrical and storm sewer systems, paving sequence, installation sequence of electrical items, maintenance of airfield electrical and NAVAID power and control circuits. 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 Meeting. No work may commence until this plan is approved. The Plan must include material haul roads.
5. The Contractor shall provide a responsible Traffic Manager whose duty shall be to control 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.

Access Control

Any time access is required to the Airport Restricted Areas the contractor shall be responsible for assuring that no breeches 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 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 authorities.

- No person shall enter the contractor worksite without authorization. Any person found within the worksite without proper identification as describe herein shall be considered unauthorized and shall be removed from the worksite.
- All persons authorized access to the worksite shall display a valid Airport ID badge or be under authorized escort.
- Persons authorized to provide escorts include airport staff and designated contractor supervisors. The number of personnel being escorted shall not exceed ten (10) non-badged personnels; this includes vendors, subcontractors, visitors and part-time workers. **Failure to provide an escort can result in loss of escort privileges, fines, revocation of the security badge, or all three.**

Challenge Procedures

All personnel are responsible for challenging and reporting anyone in their work areas not displaying an Airport ID badge. Personnel shall contact Airport Operations and/or SA Police Department and detain person(s) if safe to do so.

AIRPORT SAFETY REQUIREMENTS

Material Safety Data sheets:

Subcontractors are required to bring copies of MSDSs for all hazardous chemicals brought onto the site.

- These will be retained by the MSDS coordinator and will be accessible to all employees.

Each subcontractor must bring its specific Hazardous Communication Program and MSDSs in a binder labeled with the contractors name and identified as a Hazardous Communication Program.

- Upon leaving the job site and the removal of all hazardous materials, the binder will be returned to the subcontractors

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 (in possession of valid security badge with a driver endorsement).
- The driver possesses a valid driver's license.
- The vehicle is properly marked with the company name.
- Vehicle is marked with beacon or checkered flag or under escort.

Prohibited Vehicles
The use of motorcycles, bicycles, two-wheeled motor scooters and privately owned vehicles within the worksite is strictly prohibited.

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.

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.

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.

Construction Vehicle and Equipment Markings
All construction equipment and vehicles shall have flashing amber lights, 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.

Operation of Vehicles
No vehicle shall operate within the Airport Restricted Area:

- unless operated by an individual in possession of a valid Airport Identification Badge with a drivers endorsement or, under the direct escort of someone who is.
  - 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.

Speed Limits
The speed limit on the perimeter roads is 25 miles per hour. The speed limit on the haul route is 15 miles per hour.

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 the Airport Operations Department 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 are acceptable for incidents that occur in the public areas of the airport.

Use of Crossing Guards
For construction that requires personnel, vehicles, and equipment to cross active taxiways/runways or other areas deemed appropriate by Airport Operations, the contractor shall provide crossing guards to prohibit the unauthorized crossing of an active taxiway.

- Each crossing guard shall have and properly display a valid airport issued security badge.
- Each crossing guard is required to undergo training. This training is provided by Airport Operations.
- A crossing guard shall be provided for **both** sides of a crossing point unless otherwise specified by Airport Operations.
- Each crossing guard shall have two-way radio communication with the Air Traffic Control Tower via aviation band radio provided by the contractor.
- Each crossing guard shall be properly equipped: Hand held stop sign, safety vest, and hearing protection.

Hearing Protection
Contractor personnel working on or adjacent to the AOA are encouraged to wear hearing protection.

Worker Injuries
In the event of a serious injury requiring medical attention call **911**. If called from a cell phone, tell the emergency operator to connect to the City of Mesa Emergency Dispatch, otherwise the call will be routed to Maricopa County Dispatch and that will delay emergency response. All injuries must also be reported to Airport Operations as soon as possible.

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 title and phone numbers.

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.

Deliveries
All deliveries for the contractor shall be received by the contractor. Deliveries will not be accepted by anyone other than the contractor. The Airport nor it's authorized representatives will not accept or be responsible for deliveries.

Taxiway and Runway 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.
- Permanently closed runways require the obliteration of threshold markings, designation markings and touchdown zone markings. A Lighted 'X' shall be placed at each runway end on top of the designation numbers or at the locations shown on the plans.

Haul Routes

- Contractors are required to mark haul routes with barricades, traffic cones, signage, and light stanchions prior to the start of work. Both sides of the haul route shall be delineated.
- The haul route must be marked with red, steady burn or flashing omni-directional lights if work is schedule between sunset and sunrise.
- The contractor will monitor the haul route on a daily basis to ensure all posted markings, signs, and delineators are in place.
- Placards will be issued to transient haul trucks (i.e. concrete) upon entry into the Restricted Area by the gate guard.

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.

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 250 feet parallel to a runway centerline
- Within 160 feet parallel to a taxiway centerline
- Within 1000 feet of the end of an active runway

Staging Area

All contractor materials, equipment and supplies shall be within the contractor's designated staging area. All staging 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.

Barricades and Lighting

The perimeters of the actual work areas, all uneven surfaces, mounds and excavations shall be adequately barricaded with 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 and two (2) orange flags at least 20" x 20" square and made and installed so that they are always in the extended position and properly oriented. Low level barricades shall be orange and white in color and shall be eight (8) 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.

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, omni-directional lights are acceptable within the Restricted Area of the airport.

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 250 feet parallel to a runway centerline (trenches/excavations within 200 feet of a runway centerline require a runway closure which are subject to strict controls).
- Within 110 feet parallel to a taxiway centerline.
- Within 1000 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 closet 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 10' or that to properly delineate the trench.

Stockpiled Material

Stockpiled materials are allowed only within the contractor's designated staging 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.

Workers with Airport ID Badges
Employees with a valid Airport ID badge are authorized to proceed into the Restricted Area. Advise the employee to remain on the designated haul route to their intended area. Airport ID badges must be worn on the outermost garment once inside the Restricted Area, including contractor worksite.

Workers without Airport ID Badges
Employees without a valid Airport ID badge must first check in with the security guard and be properly escorted inside the Restricted Area to their intended area. The gate guard shall log down the date, employee name and company. Advise the employee to wait at the gate until the escort arrives.

Deliveries
Delivery trucks are not required to obtain an Airport ID badge but must be properly escorted in order to proceed inside the Restricted Area to their intended area. The gate guard shall log down the date, driver name, and company. Advise the driver to wait at the gate until the escort arrives.

Haul Trucks
Transient haul truck drivers are not required to obtain an Airport ID badge but 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.

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, in the Restricted Area of the airport without the written permission of Airport Operations. No person shall furnish, give, sell, or trade a weapon on airport property.

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 Restricted Area.
- The contractor must furnish guards a means of securing the access point should the guard have to leave the area in an emergency.

100.2. MEASUREMENT:

A. Mobilization/Demobilization will be measured for payment by the lump sum as a single complete unit of work.

B. Insurance and Bond will be measured for payment by the lump sum as a single complete unit of work.

C. Airside Safety and Security / Traffic Control will be measured for payment by the lump sum as a single complete unit of work.

100.3. PAYMENT:

A. Mobilization/Demobilization

Partial payments of the lump sum bid for mobilization will be as follows. The adjusted Contract amount for construction Items as used below is defined as the total Contract amount less the lump sum for mobilization.

A. Payment will be made upon verification of documented expenditures for plant and facility setup. The combined amount for all these facilities will be no more than 10% of the mobilization lump sum or 1% of the total Contract amount, whichever is less.

B. When 1% of the adjusted Contract amount for construction Items is earned, 50% of the mobilization lump sum bid or 5% of the total Contract amount, whichever is less, will be paid. Previous payments under this Item will be deducted from this amount.

C. When 5% of the adjusted Contract amount for construction Items is earned, 75% of the mobilization lump sum bid or 10% of the total Contract amount, whichever is less, will be paid. Previous payments under the Item will be deducted from this amount.

D. When 10% of the adjusted Contract amount for construction Items is earned, 90% of the mobilization lump sum bid or 10% of the total Contract amount, whichever is less, will be paid. Previous payments under this Item will be deducted from this amount.

E. Payment for the remainder of the lump sum bid for "Mobilization" will be made on the next estimate cycle after the initial retainage estimate or at final acceptance for projects without retainage.

B. Insurance and Bonds

Payment for Insurance and Bonds will be made upon presentation of a paid invoice for the payment bond, performance bond, and required insurance. The combined payment for bonds and insurance will be no more than 10% of the mobilization lump sum or 1% of the total Contract amount, whichever is less.

C. Airside Safety and Security / Traffic Control

Payment for Airside Safety and Security / Traffic Control shall include full compensation for furnishing and administering all requirements of the Airport Construction Safety Plan (ACSP) and furnishing all labor, materials, **four (4) Lighted Runway X's**, vehicle/personnel escorts, power vacuum sweepers, furnishing, placement and removal of all temporary airside traffic control (low level barricades and safety fence), vehicle and equipment markings, security badges and training for all construction personnel, equipment, flagmen, cell phones, and incidentals to safely control construction traffic for the San Antonio International Airport.

Partial payments will be made uniformly over the contract time, provided that the work under Airside Safety and Security / Traffic Control is maintained satisfactorily to the approval of Airport Operations and the Engineer.

100.4. BID ITEM:

Payment will be made under:

Item 100.1	Mobilization/Demobilization - lump sum
Item 100.2	Insurance and Bonds - lump sum
Item 100.3	Airside Safety and Security / Traffic Control - lump sum

END OF ITEM 100

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ITEM 101

PREPARING RIGHT-OF-WAY

101.1. DESCRIPTION: *Prepare the right of way and designated easements for construction operations by removing and disposing of all obstructions when removal of such obstructions is not specifically shown on the plans to be paid by other Items.*

101.2. MATERIALS:

A. Obstructions. Obstructions shall be considered to include, but not limited to, remains of houses not completely removed by others, foundations, floor slabs, concrete, brick, lumber, plaster, cisterns, septic tanks, basements, abandoned utility pipes or conduits, equipment or other foundations, fences, retaining walls, outhouses, shacks, and all other debris as well as buried concrete slabs, curbs, gutters, driveways, and sidewalks.

This item shall also include the removal of trees, stumps, bushes, shrubs, brush, roots, vegetation, logs, rubbish, paved parking areas, miscellaneous stone, brick, drainage structures, manholes, inlets, abandoned railroad tracks, scrap iron and all debris, whether above or below ground, except live utility facilities.

It is the intent of this specification to provide for the removal and disposal of all obstructions to the new construction together with other objectionable materials not specifically provided for elsewhere by the plans and specifications.

B. Explosives. This item shall not govern for the demolition of buildings by the use of explosives. Such demolition work shall be governed by the use of a special specification controlling the work.

C. Fences. Unless shown otherwise on the plans, all fences along the right-of-way which are damaged or removed temporarily by the Contractor shall be replaced by the Contractor to an equal or better condition at no additional cost to the City.

D. Hazardous Materials. If the Contractor encounters hazardous substances, industrial waste, other environmental pollutants, underground storage tanks, or conditions conducive to environmental damage, Contractor shall immediately stop work in the area affected and report the condition to the Owner's representative in writing. Contractor shall not be responsible for or required to conduct any investigation, site monitoring, containment, cleanup, removal, restoration or other remedial work of any kind or nature (the "remedial work") under any applicable level, state or federal law, regulation or ordinance, or any judicial order. If the Contractor agrees in writing to commence and/or prosecute some or all of the remedial work, all costs and expenses, to include any extension of the contract time, of such remedial work shall be paid by Owner to Contractor as additional compensation.

101.3. EQUIPMENT: Provide applicable equipment to conduct work as described in this specification or as specified on the plans.

101.4. CONSTRUCTION: Protect designated features on the right of way and prune trees and shrubs as directed. Do not park equipment, service equipment, store materials, or disturb the root area under the branches of trees designated for preservation. When shown on the

plans, treat cuts on trees with an approved tree wound dressing within 20 min. of making a pruning cut or otherwise causing damage to the tree. Follow all local and state regulations when burning. If burning of brush is approved, pile and burn at approved locations. When working in state or national forests or parks, coordinate work with state and federal authorities. Testing, removal, and disposal of hazardous materials will be in accordance with 101.2.D, "Hazardous Materials."

Clear areas shown on the plans of all obstructions, except those landscape features that are to be preserved. Such obstructions include but are not limited to those identified in 101.2.A, "Obstructions" and other items as specified on the plans. Remove vegetation and other landscape features not designated for preservation. Removal of live utility facilities is not included in this Item. Remove culverts, storm sewers, manholes, and inlets in proper sequence to maintain traffic and drainage.

Unless otherwise indicated on the plans, all underground obstructions shall be removed to the following depths:

- In areas receiving embankment, remove obstructions not designated for preservation to 2 ft. below natural ground.

- In areas to be excavated, remove obstructions to 2 ft. below the excavation level.

- In all other areas, remove obstructions to 1 ft. below natural ground.

When allowed by the plans or directed, cut trees and stumps off to ground level.

Holes remaining after removal of all obstructions, objectionable materials, vegetation, etc. shall be backfilled and tamped and the entire area bladed, to prevent ponding of water and to positive provide drainage. Backfill materials deemed unacceptable by the Engineer shall be removed and replaced at no additional cost to the City. In areas that are to be immediately excavated, backfilling and blading may be eliminated if approved by the Engineer. Areas to be used as borrow sites and material sources shall have all obstructions, objectionable materials, vegetation, etc., removed to the complete extent necessary to prevent such objectionable matter from becoming mixed with the material to be used in the construction.

Where a conduit is shown to be replaced, it shall be removed in its entirety and all connections to the existing conduit shall be extended to the new line. Where an existing conduit is to be cut and plugged, the line shall be cut back not less than 2 feet and a plug of concrete not less that 2 feet long shall be poured and held in the end of the pipe or the plug may be accomplished by using a precast stopper grouted into place.

Material to be removed will be designated as "salvageable" or "non-salvageable" on the plans prior to bidding by the Contractor. All "salvageable" material will remain the property of the City and will be stored at the site as directed by the Engineer. All "non-salvageable" materials and debris removed shall become the property of the Contractor and shall be removed from the site and shall be disposed of properly and in accordance with local, state, and federal requirements.

All asphaltic material shall be deposited of or recycled at a facility authorized to accept the asphalt for such purposes.

Dispose of wells in accordance with TxDOT Item 103, "Disposal of Wells."

101.5. MEASUREMENT: "Preparing Right-of-Way" for new construction will be measured by the lump sum.

101.6. PAYMENT: This item will be paid for at the contract lump sum price bid for "Preparing Right- of-Way," which price shall be full compensation for work herein specified, including the furnishing of all materials, equipment, tools, labor, and incidentals necessary to complete the work. The lump sum price will be pro-rated based on the number of phases in the project. A phase will be eligible for payment when street excavation is completed for that phase.

101.7. BID ITEM:

Item 101.1 - Preparing Right-of-Way - lump sum

END OF ITEM 101

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ITEM 530

BARRICADES, SIGNS, AND TRAFFIC HANDLING

530.1. DESCRIPTION: *This item shall govern for providing, installing, moving, repairing, maintaining, cleaning and removing upon completion of work, all barricades, signs, cones, lights and other such type devices and of handling traffic as indicated on the plans or as directed by the Engineer.*

530.2. GUIDELINES FOR BARRICADING ON CITY RIGHT-OF-WAY: The barricade contractor must locally maintain sufficient materials in stock to accommodate three or more construction phases per project. These will include all applicable traffic control sign types, trucks, trailers, arrow boards, and all other traffic control devices assigned to the Contractors barricading operation.

The *Texas Manual on Uniform Traffic Control Devices (TMUTCD)*, Section 6A-6, requires the appropriate training for all personnel who are involved in the selection, placement, and maintenance of traffic control devices on construction projects. The City of San Antonio requires that all personnel associated with barricading operations and traffic handling possess certificates from either of the two groups listed in Table 1 below. Each certificate will be valid for four years.

Table 1
Barricading Training

Texas Engineering Extension Work Zone Traffic Control	American Traffic Safety Service Training Course for Worksite Traffic

The Contractor shall have a minimum of one barricade supervisor and three persons who are responsible for construction work zone traffic control. These persons shall be based in the San Antonio metropolitan area and their sole tasks shall be implementing and maintaining construction work zone traffic control devices.

The Contractor shall have a commercial telephone answering service during non-working hours. The Contractor shall provide the City during working hours with an office telephone number, pager number, and cellular telephone number to contact the barricading supervisor. The contractor must be able to respond to any call within two hours. The barricading contractor or General Contractor must possess liability insurance in the minimum amount of one million dollars. A copy of the liability policy must be sent to the City Traffic Engineer for approval 48 hours prior to starting barricading operations.

The contractor shall comply with all standards set forth in the plan barricade detail sheets. One noncompliance letter issued by the City to the Contractor in regard to construction work zone traffic control, and not corrected within 48 hours, will be cause for delay of payment for this item.

If the general contractor elects to do his own barricading, he must comply with all the foregoing requirements. Additionally, a general contractor will be required to submit a traffic control plan (TCP) at least 72 hours in advance (excluding weekends and holidays) of starting work in each construction phase. Upon satisfactory evidence of competent barricading expertise, this requirement for a traffic control plan may be waived by the City Traffic Engineer.

530.3. EQUIPMENT: Provide the machinery, tools and equipment necessary for proper prosecution of the work. All machinery, tools and equipment used shall be maintained in a satisfactory and workmanlike manner.

530.4. CONSTRUCTION: All barricades, signs, and other types of devices listed above shall conform to the requirements of the TMUTCD. It is the contractors responsibility to see that all traffic control devices are properly installed and maintained at the job site. If it is determined by the Traffic Engineering Representative that the traffic control devices do not conform to the established standards, or are incorrectly placed to protect the general public, the Traffic Engineer shall have the option to stop the work, at no expense to the City, until the situation is corrected by the Contractor. If it is determined that additional temporary traffic control devices, special directional devices, and/or business name signs are required, they will be provided by the contractor at no additional cost. As work progresses, the location of temporary traffic control devices will be adjusted and modified as necessary by the Contractor.

All retro reflective traffic control devices such as barricades, vertical panels, signs, etc., shall be maintained by cleaning, replacing or a combination thereof such that during darkness and rain, the retro reflective characteristics shall equal or exceed the retro reflective characteristics of the standard reflective panels in the Inspectors possession.

The contractor shall contact the City of San Antonio Traffic Operations Section prior to removing any traffic signs or traffic signals. Prior to completion of the contract and removal of barricades, all applicable permanent traffic signs and signals must be in place and functioning properly. All permanent signs or traffic control devices missing or damaged during construction shall be replaced at the contractors expense. Permanent pavement marking shall be applied prior to the opening of any street to traffic. Temporary short-term expendable pavement markings may be provided prior to application of permanent markings.

The contractor must maintain all streets open to through traffic by repairing trenches, potholes, etc., at no direct payment. The contractor shall provide reasonable access to residences and all businesses within all phases of the work, as well as providing suitable access accommodations for school children, pedestrians, garbage pick-up and mail delivery by the US Postal Service. Temporary pedestrian crossing will be determined in the field by the Police Department School Services Unit. Temporary pedestrian crossings shall be 4 feet wide by 4 inches thick asphalt treated base or asphaltic concrete and will be paid for under Item 206, Asphalt Treated Base or Item 205, Hot Mix Asphaltic Concrete Pavement, respectively.

When flagging is required by the plans or Traffic Control Plan, provide a Contractor representative who has been certified as a flagging instructor through courses offered by the Texas Engineering Extension Service, the American Traffic Safety Services Association, the National Safety Council, or other approved organizations. Provide the certificate indicating course completion when requested. This representative is responsible for training and assuring that all flaggers are qualified to perform flagging duties. A qualified flagger must be independently certified by one of the organizations listed above or trained by the Contractors certified flagging instructor. Provide the Engineer with a current list of qualified flaggers before beginning flagging activities. Use only flaggers on the qualified list.

Flaggers must be courteous and able to effectively communicate with the public. When directing traffic, flaggers must use standard attire, flags, signs, and signals and follow the flagging procedures set forth in the TMUTCD.

530.5. MEASUREMENT: This item will not be measured separately but will be considered incidental to Airside Safety and Security/Traffic Control.

530.6. PAYMENT: This item will not be paid separately but will be considered incidental to Airside Safety and Security/Traffic Control and will include all: barricades, signs, and traffic handling necessary for the project. Which shall include full compensation for furnishing all labor, materials, supplies, equipment and incidentals necessary. To complete the work as specified. Failure to complete the work within time allowed in the project contract due to approving designs, testing, material shortages, closed construction season, curing periods, and testing periods will not qualify for additional compensation.

530.7. BID ITEM:

Item 530.1 - Barricades, Signs and Traffic Handling - lump sum

END OF ITEM 530

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ITEM 540

TEMPORARY EROSION, SEDIMENTATION AND WATER POLLUTION PREVENTION AND CONTROL

540.1. DESCRIPTION: *This item shall govern the control measures necessary to prevent and control soil erosion, sedimentation and water pollution which may degrade receiving waters including rivers, streams, lakes, reservoirs, tidal water, groundwater and wetlands.*

Note: The control measures contained herein shall be installed and maintained throughout the construction contract and coordinated with the permanent or existing temporary pollution control features specified elsewhere on the plans and in the specifications to assure effective and continuous water pollution control throughout the construction and post construction period. These control measures shall not be used as a substitute for the permanent pollution control measures unless otherwise directed by the Engineer in writing. The controls may include sediment control fences, inlet protection, baled hay, rock filter dams, dikes, swales, sediment traps and basins, pipe slope drains, paved flumes, construction exits, temporary seeding, sodding, mulching, soil retention blankets or other structural or non-structural water pollution controls. This item does not apply to commercial operations.

540.2. MATERIALS: The items, estimated quantities and locations of the control measures are shown on the plans; however, the Engineer may increase or decrease the quantity of these items as the need arises. The materials will be shown on the plans and in this specification. The Engineer may allow other materials and work as the need arises and as approved in writing. Pollution control measures may be applicable to contractor operations outside the right of way where such work is necessary as a result of roadway related construction such as construction and haul roads, field offices, equipment and supply areas, and materials sources.

Unless otherwise shown on the plans, provide materials that meet the following requirements:

A. Rock Filter Dams.

1. Aggregate. Furnish aggregate with hardness, durability, cleanliness, and resistance to crumbling, flaking, and eroding acceptable to the Engineer. Provide the following:

- Types 1, 2, and 4 Rock Filter Dams. Use 3 to 6 in. aggregate.
- Type 3 Rock Filter Dams. Use 4 to 8 in. aggregate.

2. Wire. Provide minimum 20 gauge galvanized wire for the steel wire mesh and tie wires for Types 2 and 3 rock filter dams. Type 4 dams require:

- a double-twisted, hexagonal weave with a nominal mesh opening of 2½ in. x 3¼ in.;
- minimum 0.0866 in. steel wire for netting;
- minimum 0.1063 in. steel wire for selvages and corners; and minimum 0.0866 in. for binding or tie wire.

3. Sandbag Material. Furnish sandbags meeting Section 540.2.I, Sandbags, except that any gradation of aggregate may be used to fill the sandbags.

B. Temporary Pipe Slope Drains. Provide corrugated metal pipe, polyvinyl chloride (PVC) pipe, flexible tubing, watertight connection bands, grommet materials, prefabricated fittings, and flared entrance sections that conform to the plans. Recycled and other materials meeting these requirements are allowed if approved. Furnish concrete in accordance with Item 505, Concrete Riprap.

C. Baled Hay. Provide hay bales weighing at least 50 lb., composed entirely of vegetable matter, measuring 30 in. or longer, and bound with wire, nylon, or polypropylene string.

D. Temporary Paved Flumes. Furnish asphalt concrete, hydraulic cement concrete, or other comparable non-erodible material that conforms to the plans. Provide rock or rubble with a minimum diameter of 6 in. and a maximum volume of ½ cu. ft. for the construction of energy dissipaters.

E. Construction Exits. Provide materials that meet the details shown on the plans and this Section.

1. Rock Construction Exit. Provide crushed aggregate for long and short-term construction exits. Furnish aggregates that are clean, hard, durable, and free from adherent coatings such as salt, alkali, dirt, clay, loam, shale, soft, or flaky materials and organic and injurious matter. Use 4- to 8- in. rock for Type 1 and 2- to 4- in. rock for Type 3. Unless otherwise shown on the plans, provide a light weight (4 oz.) non-woven filter fabric below the ballast to prevent mud and sediment migration.

2. Timber Construction Exit. Furnish No. 2 quality or better railroad ties and timbers for long-term construction exits, free of large and loose knots and treated to control rot. Fasten timbers with nuts and bolts or lag bolts, of at least ½ in. diameter, unless otherwise shown on the plans or allowed. For short-term exits, provide plywood or pressed wafer board at least ½ in. thick.

3. Foundation Course. Provide a foundation course consisting of flexible base, bituminous concrete, hydraulic cement concrete, or other materials as shown on the plans or directed.

F. Embankment for Erosion Control. Provide rock, loam, clay, topsoil, or other earth materials that will form a stable embankment to meet the intended use.

G. Pipe. Provide pipe outlet material in accordance with TxDOT Standard Specification Item 556, Pipe Underdrains, and details shown on the plans.

H. Construction Perimeter Fence.

1. Posts. Provide essentially straight wood or steel posts that are at least 60 in. long. Furnish soft wood posts with a minimum diameter of 3 in. or use 2 x 4 boards. Furnish hardwood posts with a minimum cross-section of 1½ x 1-1/5 in. Furnish T- or L-shaped steel posts with a minimum weight of 0.95 lb. per foot.

2. Fence. Provide orange construction fencing as approved by the Engineer.

3. Fence Wire. Provide 14 gauge or larger galvanized smooth or twisted wire. Provide16 gauge or larger tie wire.

4. Flagging. Provide brightly-colored flagging that is fade-resistant and at least ¾ in. wide to provide maximum visibility both day and night.

5. Staples. Provide staples with a crown at least ½ in. wide and legs at least ½ in. long.

6. Used Materials. Previously used materials meeting the applicable requirements may be used if accepted by the Engineer.

I. Sandbags. Provide sandbag material of polypropylene, polyethylene, or polyamide woven fabric with a minimum unit weight of 4 oz. per square yard, a Mullen burst-strength exceeding 300 psi, and an ultraviolet stability exceeding 70%. Use natural coarse sand or manufactured sand meeting the gradation given in Table 1 to fill sandbags. Filled sandbags must be 24 to 30 in. long, 16 to 18 in. wide, and 6 to 8 in. thick.

Table 1
Sand Gradation

Sieve #	Maximum Retained (% by Weight)
4	3%
100	80%
200	95%

J. Temporary Sediment Control Fence. Provide a net-reinforced fence using woven geo-textile fabric. Logos visible to the traveling public will not be allowed.

1. Fabric. Provide fabric materials in accordance with TxDOT DMS-6230, "Temporary Sediment Control Fence Fabric."

2. Posts. Provide essentially straight wood or steel posts with a minimum length of 48 in., unless otherwise shown on the plans. Soft wood posts must be at least 3 in. in diameter or nominal 2 x 4 in. Hardwood posts must have a minimum cross-section of 1½ x 1½ in. T- or L-shaped steel posts must have a minimum weight of 0.95 lb. per foot.

3. Net Reinforcement. Provide net reinforcement of at least 14 gauge galvanized welded wire mesh, with a maximum opening size of 2 x 4 in., at least 24 in. wide, unless otherwise shown on the plans.

4. Staples. Provide staples with a crown at least ¾ in. wide and legs ½ in. long.

5. Used Materials. Use recycled material meeting the applicable requirements if accepted by the Engineer.

K. Curb Inlet Gravel Filters.

1. Gravel Filter Bags. Furnish gravel filter bags meeting Section 540.2.I, "Sandbags." Gravel bags shall be filled with ¾ inch gravel.

2. Concrete Masonry Units. Hollow, Non-Load-Bearing Concrete blocks of 1500-2000 psi, 28-day compressive strength concrete shall be used with dimensions of 8" x 6" x6" width, height, and length, respectively.

3. Wood Blocks. Wolmanized treated 2" x 4" lumber with the length as per inlet size.

540.3. EQUIPMENT. Provide a backhoe, front end loader, blade, scraper, bulldozer, or other equipment as required when "Earthwork for Erosion Control" is specified on the plans as a bid item.

540.4. CONSTRUCTION: The contractor shall provide control measures to prevent or minimize the impact to receiving waters as required by the plans and/or as directed by the Engineer in writing.

A. Contractor Responsibilities.

1. SW3P. Implement the City's Storm Water Pollution Prevention Plan (SWP3) for the project site in accordance with the specific or general storm water permit requirements. Prevent water pollution from storm water associated with construction activity from entering any surface water or private property on or adjacent to the project site. The Contractor shall effectively prevent and control erosion and sedimentation on the site at the earliest practicable time as outlined in the approved schedule. Control measures, where applicable, will be implemented prior to the commencement of each construction operation or immediately after the area has been disturbed.

2. Preconstruction Submittals.

a. Operations on Right of Way. Prior to the start of construction, the Contractor shall submit to the Engineer, for approval, schedules for accomplishment of the pollution control measures in accordance with the Storm Water Pollution Prevention Plan (SW3P). A plan for the disposal of waste materials generated on the project site must be submitted for approval, also. The Contractor shall submit to the Engineer, for approval, the proposed SW3P for the industrial activities (such as hot mix plants, concrete batch plants, or material handling areas) on the right of way.

b. Operations off Right of Way. The Contractor shall provide the Engineer, for information purposes only, proposed methods of pollution control for Contractor operations in areas which are outside the right of way (such as construction and haul roads, field offices, equipment and supply areas, and material sources).

Pollution control measures for the Contractor's facilities off the right of way are not covered by the City's Environmental Protection Agency (EPA) NPDES general permit. The Contractor shall obtain his own Notice of Intent for the off-site operations. These pollution controls will not be measured for payment but shall be performed at the Contractor's expense.

B. General.

1. Phasing. Implement control measures in the area to be disturbed before beginning construction, or as directed. Limit the disturbance to the area shown on the plans or as directed. If, in the opinion of the Engineer, the Contractor cannot control soil erosion and sedimentation resulting from construction operations, the Engineer will limit the disturbed area to that which the Contractor is able to control. Minimize disturbance to vegetation.

2. Rainfall Events. A rain gauge shall be provided by the Contractor and located at the project site. Within 24 hours of a rainfall event of ½ inch or more as measured by the project rain gauge, the Contractor and Inspector will inspect the entire project to determine the condition of the control measures. Maintain control measures in accordance with Item 540.4.B.3, "Maintenance."

3. Maintenance. Correct ineffective control measures in accordance with this section. Implement additional controls as directed. Remove excavated material within the time requirements specified in the applicable storm water permit.

   Following a rain event as described in Item 540.4.B.2, Rainfall Event," sediment will be removed and devices repaired as soon as practicable but no later than 7 days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment needed for repair of control measures.

   In the event of continuous rainfall over a 24-hour period, or other circumstances that preclude equipment operation in the area, the Contractor will hand carry and install additional backup devices as determined by the Engineer. The Contractor will remove silt accumulations and deposit the spoils in an area approved by the Engineer as soon as practical. Any corrective action needed for the control measures will be accomplished in the sequence directed by the Engineer; however, areas adjacent to waterbodies shall generally have priority followed by devices protecting storm sewer inlets.

4. Stabilization. Stabilize disturbed areas where construction activities will be temporarily stopped, or construction becomes inactive, in accordance with the applicable storm water permit. Inactive construction areas are defined as areas in which no construction activity will occur for a period of 30 days or longer. Inactive construction areas which have been disturbed will require stabilization through the use of vegetation, mulch, erosion control matting or structural methods within 7 calendar days from the last construction activity in the area. At all times prior to stabilization, inactive construction areas shall be considered as active, disturbed construction area, contributing to the sediment loading at the site control systems. After stabilization, inactive construction areas will be considered undisturbed areas, eliminating the contribution of sediment to the erosion control devices.

5. Finished Work. Upon acceptance of vegetative cover, remove and dispose of all temporary control measures, temporary embankments, bridges, matting, falsework, piling, debris, or other obstructions placed during construction that are not a part of the finished work, or as directed. Soil retention blankets shall be removed only when, in the opinion of the Engineer, final permanent perennial seeding would be adversely affected by the presence of an existing soil retention blanket.

   The project will not be accepted until a 70% density of existing adjacent undisturbed areas is obtained, unless otherwise shown on the plans. When shown on the plans, the Engineer may accept the project when adequate controls are in place that will control erosion, sedimentation, and water pollution until sufficient vegetative cover can be established.

6. Restricted Activities. Do not locate disposal areas, stockpiles, or haul roads in any wetland, water body, or streambed. Do not install temporary construction crossings in or across any water body without the prior approval of the appropriate resource agency and the Engineer. Restrict construction operations in any water body to the necessary areas as shown on the plans or applicable permit, or as directed. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for stream crossings.

   Provide protected storage area for paints, chemicals, solvents, and fertilizers at an approved location. Keep paints, chemicals, solvents, and fertilizers off bare ground and provide shelter for stored chemicals.

C. Installation, Maintenance, and Removal Work. Perform work in accordance with the specific or general storm water permit. Install and maintain the integrity of temporary erosion and sedimentation control devices to accumulate silt and debris until earthwork construction and permanent erosion control features are in place or the disturbed area has been adequately stabilized as determined by the Engineer. If a device ceases to function as intended, repair or replace the device or portions thereof as necessary. Remove sediment, debris, and litter. When approved, sediments may be disposed of within embankments, or in the right of way in areas where the material will not contribute to further siltation. Dispose of removed material in accordance with federal, state, and local regulations. Remove devices upon approval or when directed. Upon removal, finish-grade and dress the area. Stabilize disturbed areas in accordance with the permit, and as shown on the plans or directed. The Contractor retains ownership of stockpiled material and must remove it from the project when new installations or replacements are no longer required.

1. Rock Filter Dams for Erosion Control. Remove trees, brush, stumps, and other objectionable material that may interfere with the construction of rock filter dams. Place sandbags as a foundation when required or at the Contractor's option. For Types 1, 2, 3, and 5, place the aggregate to the lines, height, and slopes specified, without undue voids. For Types 2 and 3, place the aggregate on the mesh and then fold the mesh at the upstream side over the aggregate and secure it to itself on the downstream side with wire ties, or hog rings, or as directed. Place rock filter dams perpendicular to the flow of the stream or channel unless otherwise directed. Construct filter dams according to the following criteria, unless otherwise shown on the plans:

a. Type 1 (Non-reinforced).

(1) Height. At least 18 in. measured vertically from existing ground to top of filter dam.
(2) Top Width. At least 2 ft.
(3) Slopes. At most 2:1.

b. Type 2 (Reinforced).

(1) Height. At least 18 in. measured vertically from existing ground to top of filter dam.
(2) Top Width. At least 2 ft.
(3) Slopes. At most 2:1.

c. Type 3 (Reinforced).

(1) Height. At least 36 in. measured vertically from existing ground to top of filter dam.
(2) Top Width. At least 2 ft.
(3) Slopes. At most 2:1.

d. Type 4 (Sack Gabions). Unfold sack gabions and smooth out kinks and bends. For vertical filling, connect the sides by lacing in a single loop–double loop pattern on 4-to 5-in. spacing. At one end, pull the end lacing rod until tight, wrap around the end, and twist 4 times. At the filling end, fill with stone, pull the rod tight, cut the wire with approximately 6 in. remaining, and twist wires 4 times. For horizontal filling, place sack flat in a filling trough, fill with stone, and connect sides and secure ends as described above. Lift and place without damaging the gabion. Shape sack gabions to existing contours.

e. Type 5. Provide rock filter dams as shown on the plans.

2. Temporary Pipe Slope Drains. Install pipe with a slope as shown on the plans or as directed. Construct embankment for the drainage system in 8-in. lifts to the required elevations. Hand-tamp the soil around and under the entrance section to the top of the embankment as shown on the plans or as directed. Form the top of the embankment or earth dike over the pipe slope drain at least 1 ft. higher than the top of the inlet pipe at all points. Secure the pipe with hold-downs or hold-down grommets spaced a maximum of 10 ft. on center. Construct the energy dissipaters or sediment traps as shown on the plans or as directed. Construct the sediment trap using concrete in accordance with Item 505, “Concrete Riprap,” when designated on the plans. Rubble riprap in accordance with TxDOT Standard Specification Item 432, “Riprap” may also be used when designated on the plans or as directed by the Engineer.

3. Baled Hay for Erosion and Sedimentation Control. Install hay bales at locations shown on the plans by embedding in the soil at least 4 in. and, where possible, approximately ½ the height of the bale, or as directed. Fill gaps between bales with hay.

4. Temporary Paved Flumes. Construct paved flumes as shown on the plans or as directed. Provide excavation and embankment (including compaction of the subgrade) of material to the dimensions shown on the plans, unless otherwise indicated. Install a rock or rubble riprap energy dissipater, constructed from the materials specified above to a minimum depth of 9 in. at the flume outlet to the limits shown on the plans or as directed.

5. Construction Exits. When tracking conditions exist, prevent traffic from crossing or exiting the construction site or moving directly onto a public roadway, alley, sidewalk, parking area, or other right of way areas other than at the location of construction exits. Construct exits for either long or short-term use.

   a. Long-Term. Place the exit over a foundation course, if necessary. Grade the foundation course or compacted subgrade to direct runoff from the construction exits to a sediment trap as shown on the plans or as directed. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed.

      (1) Type 1. Construct to a depth of at least 8 in. using crushed aggregate as shown on the plans or as directed.
      (2) Type 2. Construct using railroad ties and timbers as shown on the plans or as directed.

   b. Short-Term.

      (1) Type 3. Construct using crushed aggregate, plywood, or wafer board. This type of exit may be used for daily operations where long-term exits are not practical.
      (2) Type 4. Construct as shown on the plans or as directed.

6. Earthwork for Erosion and Sediment Control. Perform excavation and embankment operations to minimize erosion and to remove collected sediments from other erosion control devices.

   a. Excavation and Embankment for Erosion Control Features. Place earth dikes, swales or combinations of both along the low crown of daily lift placement, or as directed, to prevent runoff spillover. Place swales and dikes at other locations as shown on the plans or as directed to prevent runoff spillover or to divert runoff. Construct cuts with the low end blocked with undisturbed earth to prevent erosion of hillsides. Construct sediment traps at drainage structures in conjunction with other erosion control measures as shown on the plans or as directed. Where required, create a sediment basin providing 3,600 cu. ft. of storage per acre drained, or equivalent control measures for drainage locations that serve an area with 10 or more disturbed acres at one time, not including offsite areas.

   b. Excavation of Sediment and Debris. Remove sediment and debris when accumulation affects the performance of the devices, after a rain, and when directed.

7. Construction Perimeter Fence. Construct, align, and locate fencing as shown on the plans or as directed.

    a. Installation of Posts. Embed posts 18 in. deep or adequately anchor in rock, with a spacing of 8 to 10 ft.

    b. Wire Attachment. Attach the top wire to the posts at least 3 ft. from the ground. Attach the lower wire midway between the ground and the top wire.

    c. Flag Attachment. Attach flagging to both wire strands midway between each post. Use flagging at least 18 in. long. Tie flagging to the wire using a square knot.

8. Sandbags for Erosion Control. Construct a berm or dam of sandbags that will intercept sediment-laden storm water runoff from disturbed areas, create a retention pond, detain sediment, and release water in sheet flow. Fill each bag with sand so that at least the top 6 in. of the bag is unfilled to allow for proper tying of the open end. Place the sandbags with their tied ends in the same direction. Offset subsequent rows of sandbags ½ the length of the preceding row. Place a single layer of sandbags downstream as a secondary debris trap. Place additional sandbags as necessary or as directed for supplementary support to berms or dams of sandbags or earth.

9. Temporary Sediment-Control Fence. Provide temporary sediment-control fence near the downstream perimeter of a disturbed area to intercept sediment from sheet flow. Incorporate the fence into erosion-control measures used to control sediment in areas of higher flow. Install the fence as shown on the plans, as specified in this Section, or as directed.

    a. Installation of Posts. Embed posts at least 18 in. deep, or adequately anchor, if in rock, with a spacing of 6 to 8 ft. and install on a slight angle toward the run-off source.

    b. Fabric Anchoring. Dig trenches along the uphill side of the fence to anchor 6 to 8 in. of fabric. Provide a minimum trench cross-section of 6 x 6 in. Place the fabric against the side of the trench and align approximately 2 in of fabric along the bottom in the upstream direction. Backfill the trench, then hand-tamp.

    c. Fabric and Net Reinforcement Attachment. Unless otherwise shown under the plans, attach the reinforcement to wooden posts with staples, or to steel posts with T- clips, in at least 4 places equally spaced. Sewn vertical pockets may be used to attach reinforcement to end posts. Fasten the fabric to the top strand of reinforcement by hog rings or cord every 15 in. or less.

d. Fabric and Net Splices. Locate splices at a fence post with a minimum lap of 6 in. attached in at least 6 places equally spaced, unless otherwise shown under the plans. Do not locate splices in concentrated flow areas. Requirements for installation of used temporary sediment control fence include the following:

- fabric with minimal or no visible signs of biodegradation (weak fibers),
- fabric without excessive patching (more than 1 patch every 15 to 20 ft.),
- posts without bends, and
- backing without holes.

10. Curb Inlet Gravel Filter.

a. Installation. Install the curb inlet gravel filters in the following manner:

(1) Place the 2" x 4" treated lumber in front of and parallel with the opening of the inlet.
(2) Place the Concrete Masonry Units (CMUs) around the inlet, to be protected, in front of the 2" x 4" lumber, with the openings of the CMUs facing the inlet.
(3) Surround the CMUs with gravel bags, making certain that there are no gaps are evident between the gravel bags.

b. Sediment Control. When the accumulated sediment deposit reaches a depth of approximately 6 inches, it shall be removed and disposed of at approved sites in a manner that will not contribute to additional siltation. If the structure ceases to function as intended, the Engineer may direct that the Filter bag be replaced. Such replacement will not be measured for payment. Torn or punctured bags shall be replaced with a new Filter bag.

540.5 MEASUREMENT: If the Contractor is required to install temporary erosion, sediment and water pollution control measures due to his negligence, carelessness, lack of maintenance, or failure to install permanent controls as a part of the work as scheduled, and measures are ordered in writing by the Engineer, such work shall not be measured for payment, but shall be performed at the Contractor's expense.

In case of failure on the part of the Contractor to prevent and control soil erosion, sedimentation and water pollution which may degrade receiving water, the Engineer reserves the right to employ outside assistance or to use City forces to provide the necessary corrective measures. All costs including engineering costs will be deducted from any moneys due or to become due to the Contractor.

When the need for control measures cannot be attributed to the contractor's negligence, carelessness, lack of maintenance or failure to install permanent water pollution control measures and these measures are shown on the plans and/or directed by the Engineer, these measures shall be measured and paid for in accordance with contract bid items shown under this section.

A. Rock Filter Dams. Installation or removal of rock filter dams will be measured by the foot or by the cubic yard. The measured volume will include sandbags, when used.

1. Linear Measurement. When rock filter dams are measured by the foot, measurement will be along the centerline of the top of the dam.

2. Volume Measurement. When rock filter dams are measured by the cubic yard, measurement will be based on the volume of rock computed by the method of average end areas.

a. Installation. Measurement will be made in final position.

b. Removal. Measurement will be made at the point of removal.

B. Temporary Pipe Slope Drains. Temporary pipe slope drains will be measured by the foot.

C. Baled Hay. Baled hay will be measured by each bale.

D. Temporary Paved Flumes. Temporary paved flumes will be measured by the square yard of surface area. The measured area will include the energy dissipater at the flume outlet.

E. Construction Exits. Construction exits will be measured by the square yard of surface area.

F. Earthwork for Erosion and Sediment Control. Earthwork for erosion and sediment control will not be measured directly but will be considered subsidiary to this or other pertinent items.

G. Construction Perimeter Fence. Construction perimeter fence will be measured by the foot.

H. Sandbags for Erosion Control. Sandbags will be measured as each sandbag or by the foot along the top of sandbag berms or dams.

I. Temporary Sediment-Control Fence. Temporary sediment-control fence will be measured by the foot.

J. Curb Inlet Gravel Filter. Curb inlet gravel filter will be measured by the linear foot, as measured on the centerline of the gravel bags installed.

540.6. PAYMENT: **All of the following will not be paid for directly but are subsidiary to the pertinent BID ITEM shown below:**

- erosion-control measures for Contractor project-specific locations (PSLs) inside and outside the right of way (such as construction and haul roads, field offices, equipment and supply areas, plants, and material sources);
- removal of litter;
- repair to devices and features damaged by Contractor operations;
- added measures and maintenance needed due to negligence, carelessness, lack of maintenance, and failure to install permanent controls;

- removal and reinstallation of devices and features needed for the convenience of the Contractor;
- finish grading and dressing upon removal of the device; and
- minor adjustments including but not limited to plumbing posts, reattaching fabric, minor grading to maintain slopes on an erosion embankment feature, or moving small numbers of sandbags.
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The Contractor will be reimbursed for maintenance, repair, or reinstallation of devices and features when the need for additional control measures cannot be attributed to the above, as determined by the Engineer. Stabilization of disturbed areas will be paid for under pertinent Items. Furnishing and installing pipe for outfalls associated with sediment traps and ponds will not be paid for directly but is subsidiary to the excavation and embankment under this Item.

Pollution control measures outside the right of way will not be measured for payment but shall be performed at the Contractor's expense.

Control measures as shown on the plans will be paid for in accordance with applicable bid items as shown below:

A. Rock Filter Dams. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid as follows:

1. Installation. Installation will be paid for as "Rock Filter Dams (Install)" of the type specified. This price is full compensation for furnishing and operating equipment, finish backfill and grading, lacing, proper disposal, labor, materials, tools, and incidentals.

2. Removal. Removal will be paid for as "Rock Filter Dams (Remove)." This price is full compensation for furnishing and operating equipment, proper disposal, labor, materials, tools, and incidentals.

   When the Engineer directs that the rock filter dam installation or portions thereof be replaced, payment will be made at the unit price bid for "Rock Filter Dams (Remove)" and for "Rock Filter Dams (Install)" of the type specified. This price is full compensation for furnishing and operating equipment, finish backfill and grading, lacing, proper disposal, labor, materials, tools, and incidentals

B. Temporary Pipe Slope Drains. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Temporary Pipe Slope Drains" of the size specified. This price is full compensation for furnishing materials, removal and disposal, furnishing and operating equipment, labor, tools, and incidentals.

Removal of temporary pipe slope drains will not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the pipe slope drain installation or portions thereof be replaced, payment will be made at the unit price bid for "Temporary Pipe Slope Drains" of the size specified, which is full compensation for the removal and reinstallation of the pipe drain.

Earthwork required for the pipe slope drain installation, including construction of the sediment trap, will be measured and paid for under Section 540.5.F, "Earthwork for Erosion and Sediment Control." Riprap concrete or stone, when used as an energy dissipater or as a stabilized sediment trap, will be measured and paid for in accordance with Item 505, "Concrete Riprap" or TxDOT Item 432, "Riprap," respectively.

C. Baled Hay. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Baled Hay." This price is full compensation for furnishing and placing bales, excavating trenches, removal and disposal, equipment, labor, tools, and incidentals.

When the Engineer directs that the baled hay installation (or portions thereof) be replaced, payment will be made at the unit price bid for "Baled Hay," which is full compensation for removal and reinstallation of the baled hay.

D. Temporary Paved Flumes. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Temporary Paved Flume (Install)" or "Temporary Paved Flume (Remove)." This price is full compensation for furnishing and placing materials, removal and disposal, equipment, labor, tools, and incidentals.

When the Engineer directs that the paved flume installation or portions thereof be replaced, payment will be made at the unit prices bid for "Temporary Paved Flume (Remove)" and "Temporary Paved Flume (Install)." These prices are full compensation for the removal and replacement of the paved flume and for equipment, labor, tools, and incidentals.

Earthwork required for the paved flume installation, including construction of a sediment trap will be considered subsidiary to this item and will not be measured or paid for directly.

E. Construction Exits. Contractor-required construction exits from off right-of-way locations or on-right of way PSLs will not be paid for directly but are subsidiary to pertinent Items.

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" for construction exits needed on right-of-way access to work areas required by the Department will be paid for at the unit price bid for "Construction Exits (Install)" of the type specified or "Construction Exits (Remove)." This price is full compensation for furnishing and placing materials, excavating, removal and disposal, cleaning vehicles, labor, tools, and incidentals.

When the Engineer directs that a construction exit or portion thereof be removed and replaced, payment will be made at the unit prices bid for "Construction Exit (Remove)" and "Construction Exit (Install)" of the type specified. These prices are full compensation for the removal and replacement of the construction exit and for equipment, labor, tools, and incidentals.

Construction of sediment traps used in conjunction with the construction exit will be considered subsidiary to this item and will not be measured or paid for directly.

F. Earthwork for Erosion and Sediment Control. The work performed and materials furnished in accordance with this Item will not be paid for directly but is subsidiary to pertinent Items unless otherwise shown on the plans.

Sprinkling and rolling required by this Item will not be paid for directly, but will be subsidiary to this Item.

G. Construction Perimeter Fence. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Construction Perimeter Fence." This price is full compensation for furnishing and placing the fence; digging, fence posts, wire, and flagging; removal and disposal; and materials, equipment, labor, tools, and incidentals.

Removal of construction perimeter fence will be not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the perimeter fence installation or portions thereof be removed and replaced, payment will be made at the unit price bid for "Construction Perimeter Fence," which is full compensation for the removal and reinstallation of the construction perimeter fence.

H. Sandbags for Erosion Control. Sandbags will be paid for at the unit price bid for "Sandbags for Erosion Control" (of the height specified when measurement is by the foot). This price is full compensation for materials, placing sandbags, removal and disposal, equipment, labor, tools, and incidentals.

Removal of sandbags will not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the sandbag installation or portions thereof be replaced, payment will be made at the unit price bid for "Sandbags for Erosion Control," which is full compensation for the reinstallation of the sandbags.

I. Temporary Sediment-Control Fence. The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Temporary Sediment-Control Fence." This price is full compensation for furnishing and placing the fence; trenching, fence posts, fabric and backfill; removal and disposal; and equipment, labor, tools, and incidentals.

Removal of temporary sediment-control fence will not be paid for directly but is subsidiary to the installation Item. When the Engineer directs that the temporary sedimentation control fence installation or portions thereof be replaced, payment will be made at the unit price bid for "Temporary Sediment-Control Fence," which is full compensation for the removal and reinstallation of the temporary sediment-control fence.

J. Curb Inlet Gravel Filter. The work performed and the materials furnished as specified herein, measured as provided under "Measurement" will be paid for at the unit price bid per linear foot for "Curb Inlet Gravel Filter," which payment shall be full compensation for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the work as specified, including maintaining and replacing the gravel bags as required by these specifications, removal of accumulated silt, and removal and proper disposal of the "Curb Inlet Gravel Filter" upon completion of site stabilization.

540.7. BID ITEM:

Item 540 - Storm Water Pollution Prevention Plan

END OF ITEM 540

THE FOLLOWING ITEMS ARE SPECIAL PROVISIONS TO THE CITY OF SAN ANTONIO STANDARD SPECIFICATIONS FOR CONSTRUCTION DATED JUNE 2008

General

1. None

Standard Specifications

1. Delete Item 700 - Cost Loaded Schedules *(dated June 2008)* in its entirety and replace with Item 700 – Project Schedules *(dated February 2010)* shown on the attached document.

ITEM 700
PROJECT SCHEDULES

This item shall govern the creation, maintenance, and delivery of Critical Path Method (CPM) project schedules.

CRITICAL PATH METHOD PROJECT SCHEDULE

The Contractor shall create and maintain a Critical Path Method (CPM) Project Schedule showing the manner of execution of work that the contractor intends to follow in order to complete the contract within the allotted time. The project schedule shall employ computerized CPM for the planning, scheduling and reporting of the work as described in this specification. The CPM project schedule shall be prepared using the Precedence Diagram Method (PDM). The Contractor shall create and maintain the schedule using Primavera Project Manager 5.x or above or Primavera Contractor 4.1 or above. For construction contracts under $300K and project durations 90 days or less, the project schedule can be created and maintained in Microsoft Project software. The observance of the requirements herein is an essential part of the work to be done under the contract. No direct compensation will be allowed for fulfilling these requirements, as such work is considered subsidiary to the various bid items of the contract.

PERSONNEL

The Contractor shall provide an individual, referred to hereafter as the Scheduler, to create and maintain the Project Schedule. The Scheduler shall be proficient in Critical Path Method (CPM) analysis as demonstrated through certification from Project Management Institute (PMI), Association for the Advancement of Cost Engineering (AACE) or possess sufficient experience to be able to perform required tasks on the specified software and be able to prepare and interpret reports from the software. The Scheduler shall be made available for discussion or meetings when requested by the City.

PROJECT SCHEDULE

1. GENERAL:

At least twenty (20) calendar days prior to the pre-construction conference, the Contractor shall submit a Project Schedule, which shall show the sequence and interdependence of activities required for complete performance of the work. All schedule submittals shall be in the electronic form to include PDF plots of the schedule, a PDF plot defining the Critical Path and two week look-ahead, and include the native Primavera file format. The Contractor shall submit the schedule to the Web-portal and Project Manager via electronic mail, CD-Rom, floppy disc, or any other electronic media acceptable to the City. The City will review the Project Schedule within twenty (20) calendar days for compliance with the specifications and notify the Contractor at the pre-construction conference of its acceptability. No work shall begin until the City has accepted the Project Schedule.

2. SEQUENCE:

The Project Schedule shall show the sequence and interdependence of activities required for complete performance of the work. The Contractor shall be responsible for assuring all work sequences are logical and show a coordinated plan of the work. The purpose of

the City requiring the Project Schedule shall be to:

a. Ensure adequate planning during the execution and progress of the work in accordance with the allowable number of calendar days and all milestones.

b. Assure coordination of the efforts of the Contractor, City, Utilities and others that may be involved in the project and that activities are included in the schedule highlighting coordination points with others,

c. Assist the Contractor and City in monitoring the progress of the work and evaluating proposed changes to the contract, and

d. Assist the City in administering the contract time requirements.

3. ACTIVITIES:
Each activity on the Project Schedule shall include:

a. An activity number utilizing an alphanumeric designation system that is agreeable to the City;

b. Concise description of the work represented by the activity; and

c. Activity durations in whole work days with a maximum of twenty (20) work days. Durations greater than twenty (20) work days may be used for non-construction activities (mobilization, submittal preparation, curing, etc.), and other activities mutually agreeable between the City and Contractor.

The Contractor shall provide to the City a legend for all abbreviations. The activities shall be coded so that organized plots of the Project Schedule may be produced. Typical activity coding includes traffic control phase, location and work type. Show an estimated production rate per working day for each work activity. Activity durations shall be based on production rates shown.

4. WORK DURATION AND RESOURCES:
The schedule layout shall be grouped by Project and then by Work Breakdown Structure (WBS) for organizational purposes. The original and remaining duration shall be displayed. The grouping band will, by default, report work days planned. One additional level of effort activity shall be added to the schedule as a "time calculator" with a seven-day calendar without holidays. The calculation of their days will show up in the duration columns in Primavera.

If specified by general note, the Contractor shall plan and incorporate major resources into the Project Schedule. Major resources are defined as crews and equipment that constrain the Contractor from pursuing available work. The resources shall accurately represent the Contractor's planned equipment and manpower to achieve the productivity rates specified above.

Work shall be scheduled based upon the Contractor's standard work week utilizing the appropriate calendar assignments in Primavera software If the Contractor's initial baseline plan is to perform the Work on a six or seven-day work week, then the appropriate calendar in Primavera must be used and the Engineer must be notified in writing through the Submittal process. This does not affect the total calendar days allotted by the contract.

Assign working calendars for the days you plan to work. Designate all City holidays (12) as non-working days (holidays). For dates beyond the current calendar year assume that

the City holidays are the same as the current calendar year.
Seasonal weather conditions shall be considered and included in the Project Schedule for all work influenced by temperature and/or precipitation. Seasonal weather conditions shall be determined by an assessment of average historical climatic conditions. Average historical weather data is available through the National Oceanic and Atmospheric Administration (NOAA). These effects will be simulated through the use of work calendars for each major work type (i.e., earthwork, concrete paving, structures, asphalt, drainage, etc.). Project and work calendars should be updated each month to show days actually able to work on the various work activities.

Total float is defined as the amount of time between the early start date and the late start date, or the early finish date and the late finish date, for each and every activity in the schedule. Float time in the Project Schedule is a shared commodity between the City and the Contractor.

Only City responsible delays in activities that affect milestone dates or the contract completion date, as determined by CPM analysis, will be considered for a time extension.

5. OTHER REQUIREMENTS:

Code and organize all work by Work Breakdown Structure (WBS).An example WBS will be provided by the City.

Percent complete type shall be Duration Percent Complete.

Duration type shall be Fixed Units

Submittals shall be included in the schedule with a logical tie to what each drives.

Proposed Change Orders shall be added the schedule identifying it as a Proposed Change Order. This task must be linked to the schedule with logical ties and approved by the City. Upon approval of Change Order, task will be renamed identifying work performed and Change Order number and resources will be added to the task.

Constraints are limited to project start, project finish, material delivery, and use on Submittals. If a schedule requires additional constraints, then an explanation shall accompany the schedule Submittal.

The schedule shall include activity milestones for material delivery.

Default progress is disallowed.

If work is performed out of sequence, then an explanation must be included in the project narrative.

JOINT REVIEW, REVISION AND ACCEPTANCE

Within twenty (20) calendar days of receipt of the Contractor's proposed Project Schedule, the City shall evaluate the schedule for compliance with this specification, and notify the Contractor of its findings. If the City requests a revision or justification, the Contractor shall provide a satisfactory revision or adequate justification to the satisfaction of the City within seven (7) calendar days. If the Contractor submits a Project Schedule for acceptance, which is based on a sequence of work not shown in the plans, then the Contractor shall notify the City in writing, separate from the schedule submittal.

The City's review and acceptance of the Contractor's Project Schedule is for conformance to the requirements of the

contract documents only. Review and acceptance by the City of the Contractor's Project Schedule does not relieve the Contractor of any of its responsibility for the Project Schedule or of the Contractor's ability to meet interim milestone dates (if specified) and the contract completion date, nor does such review and acceptance expressly or by implication warrant, acknowledge or admit the reasonableness of the logic, durations, manpower or equipment loading of the Contractor's Project Schedule. In the event the Contractor fails to define any element of work, activity or logic and the City review does not detect this omission or error, such omission or error, when discovered by the Contractor or City shall be corrected by the Contractor at the next monthly schedule update and shall not affect the project completion date.

Acceptance by the City of a Baseline or project update schedule that exceeds contractual time does not alleviate the Contractor from meeting the contractual completion date.

Payment may be delayed until acceptable baseline or updated schedule is received and accepted by the City.

UPDATES

The Project Schedule shall be updated on a monthly basis. The Project Schedule update shall be submitted one week prior to the pay application submittal. The Contractor shall meet with the City each month at a scheduled update meeting to review actual progress made through the Data Date of the schedule update as determined by the Project Manager. The review of progress will include dates activities actually started and/or completed, the percentage of work completed, the remaining duration of each activity started and/or completed, and the amount of work to complete with an analysis of the relationship between the remaining duration of the activity and the quantity of material to install over that given period of time with a citation of past productivity. The monthly schedule update shall include a progress narrative explaining progress, identifying progress made out of sequence, defining the Critical Path, identification of any potential delays, etc. The Project Schedule Narrative template will be required for the narrative.

The project schedule update layout shall be grouped by Project, then WBS. The layout shall include the following columns:

a. Activity ID
b. Activity Description
c. Original Durations
d. Remaining Durations
e. Start and Finish Dates
f. Baseline Start and Finish Dates
g. Total Float
h. Performance Percent Complete
i. Display logic and target bars in the Gantt bar chart view

PROJECT SCHEDULE REVISIONS

If the Contractor desires to make major changes in the Project Schedule, the Contractor shall notify the City in writing and submit the proposed schedule revision. The written notification shall include the reason for the proposed revision, what the revision is comprised of, and how the revision was incorporated into the schedule. Major changes are hereby defined as those that may affect compliance with the contract requirements or those that change the critical path. All other changes may be accomplished through the monthly updating process without written notification.

TIME IMPACT ANALYSIS

The Contractor shall notify the City when an impact may justify an extension of contract time or adjustment of milestone dates. This notice shall be made in writing as soon as

possible, but no later than the end of the next estimate period after the commencement of an impact or the notice for a change is given to the Contractor. Not providing notice to the City within twenty (20) calendar days after receipt will indicate the Contractor's approval of the time charges as shown on that time statement. Future consideration of that statement will not be permitted and the Contractor forfeits his right to subsequently request a time extension or time suspension unless the circumstances are such that the Contractor could not reasonably have knowledge of the impact by the end of the next estimate period.

When changes are initiated or impacts are experienced, the Contractor shall submit to the City a written time impact analysis describing the influence of each change or impact. A "time impact analysis" is an evaluation of the effects of changes in the construction sequence, contract, plans, or site conditions on the Contractor's plan for constructing the project, as represented by the schedule. The purpose of the time impact analysis is to determine if the overall project has been delayed, and if necessary, to provide the Contractor and the City a basis for making adjustments to the contract.

A time impact analysis shall consist of one or all of the steps listed below:

1. Establish the status of the project before the impact using the most recent project schedule update prior to the impact occurrence.

2. Predict the effect of the impact on the most recent project schedule update prior to the impact occurrence. This requires estimating the duration of the impact and inserting the impact into the schedule update. Any other changes made to the schedule including modifications to the calendars or constraints shall be noted.

3. Track the effects of the impact on the schedule during its occurrence. Note any changes in sequencing, and mitigation efforts.

4. Compare the status of the work prior to the impact (Step 1) to the prediction of the effect of the impact (Step 2), and to the status of the work during and after the effects of the impact are over (Step 3). Note that if an impact causes a lack of access to a portion of the project, the effects of the impact may extend to include a reasonable period for remobilization.

The time impact analysis shall be electronically submitted to the City. If the Project Schedule is revised after the submittal of a time impact analysis but prior to its approval, the Contractor shall promptly indicate in writing to the City the need for any modification to its time impact analysis. One (1) copy of each time impact analysis shall be submitted within fourteen (14) calendar days after the completion of an impact. The City may require Step 1 and Step 2 of the time impact analysis be submitted at the commencement of the impact, if needed to make a decision regarding the suspension of contract time. Approval or rejection of each time impact analysis by the City shall be made within fourteen (14) calendar days after receipt unless subsequent meetings and negotiations are necessary.

MEASUREMENT and PAYMENT

Project Schedule will not be measured or paid for directly, but shall be included in the unit price bid for the items of construction in which the operations occur.

PROJECT SCHEDULE NARRATIVE

PROJECT NAME:	
CONTRACTOR NAME:	
PERIOD ENDING:	
SUBMITTAL DATE:	
PREPARED BY:	

Evaluation Summary	
NTP:	
Data Date:	
Contractual Completion Date:	
Current Scheduled Completion Date:	
Previous Period Scheduled Completion Date:	
Contract Calendar Days:	

Yes	No	
		Contractor has included both a hard copy (pdf) and the native Primavera file format?
		Project calendars have been updated to reflect actual charged working days for the progress period, according to the contract time statement?
		Schedule update reflects approved change orders for the progress period?
		Have any major changes been made to the schedule? *(A major change is defined as those that may affect compliance with the contract requirements or those that change the critical path. If yes, written notification is required to include the reason for the proposed revision, what the revision is comprised of, and how the revision was incorporated into the schedule.)* If yes, provide details in Section 3 & 5 below.
		Are any delays included in this schedule submittal for which the Contractor intends to submit a Time Impact Analysis (TIA) for a claim delay? If yes, provide details in Section 6 below.

1. Identify general progress for the update period.
2. Identify work performed out of sequence and provide an explanation for the reason.

3. Describe any changes made to the project's logic and the reason for the change(s).
4. Identify any new constraints used and provide an explanation for their use.
5. Define the critical path of the project, including any changes from the previous update.
6. Identify any delays that have occurred for the progress period, the reason for the delay, and current status.
7. Identify any potential delays and possible mitigation efforts.
8. Other comments.

APPENDIX

Painting, Marking and Lighting of Vehicles used on an Airport
Operation Safety on Airports During Construction
Airport Safety Construction Plan

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U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

Subject: Painting, Marking, and Lighting of Vehicles Used on an Airport	**Date:** April 1, 2010	**AC No:** AC 150/5210-5D
	Initiated by: AAS-100	**Change:**

1. PURPOSE. This advisory circular (AC) provides guidance, specifications, and standards for painting, marking, and lighting of vehicles operating in the airport air operations area (AOA). The approved lights, colors, and markings herein assure the conspicuity of vehicles operating in the AOA from both the ground and the air.

2. CANCELLATION. This AC cancels AC 150/5210-5C, Painting, Marking, and Lighting of Vehicles Used on an Airport, dated August 31, 2007.

3. APPLICATION. The Federal Aviation Administration (FAA) recommends the guidelines and standards in this Advisory Circular for vehicles operating in the airport AOA. In general, use of this AC is not mandatory. ***However***, use of this AC is mandatory for vehicles funded with federal grant monies through the Airport Improvement Program (AIP) and/or with revenue from the Passenger Facility Charges (PFC) Program. See Grant Assurance No. 34, "Policies, Standards, and Specifications," and PFC Assurance No. 9, "Standard and Specifications."

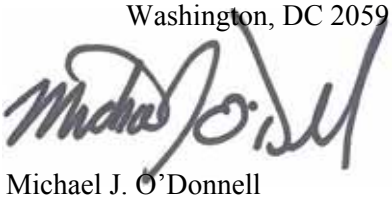
Vehicles covered by this AC that do not meet this standard may be used until the vehicle is repainted or replaced, but no later than **December 31, 2010.**

4. PRINCIPAL CHANGES. This AC contains new specifications and recommendations for the painting, marking, and lighting of Towbarless Tow Vehicles (TLTVs).

5. METRIC UNITS. To promote an orderly transition to metric units, this AC includes both English and metric dimensions. The metric conversions may not be exact equivalents, and until there is an official changeover to the metric system, the English dimensions will govern.

6. COMMENTS OR SUGGESTIONS for improvements to this AC should be sent to:

Manager, Airport Engineering Division
Federal Aviation Administration
ATTN: AAS-100
800 Independence Avenue, S.W.
Washington, DC 20591



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

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PAINTING, MARKING, AND LIGHTING OF VEHICLES USED ON AN AIRPORT

1. SOURCES OF APPLICABLE DOCUMENTS.

a. American National Standards Institute, Inc. (ANSI), 25 West 43rd St. 4th Floor, New York, NY 10036. Website: **www.ansi.org**

b. American Society for Testing & Materials (ASTM), ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959. Website: **www.astm.org**

c. The National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, Massachusetts 02169-7471. Website: **www.nfpa.org**

d. The U. S. General Services Administration (GSA), Centralized Mailing List Services, 501 West Felix Street, Whse 9, South End P.O. Box 6477, Fort Worth, Texas 76115-6477. Website: **www.gsa.gov**

e. The Superintendent of Documents, U.S. Government Printing Office, 732 North Capitol St. NW, Washington, DC 20401.

f. Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001. Website: **www.sae.org**

g. FAA Advisory Circulars: U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Ave., Landover, MD 20785. Website: **www.faa.gov**

h. FAA Engineering Briefs: **www.faa.gov/airports/engineering/engineering_briefs/**

2. DEFINITIONS.

The following definitions apply in this AC:

a. **Vehicle –** All conveyances, except aircraft, used on the ground to transport persons, cargo, equipment or those required to perform maintenance, construction, service, and security duties.

b. **Air Operations Area (AOA) –** The portion of airport that encompasses the landing, take off, taxiing, and parking areas for aircraft.

c. **Airport Emergency Vehicles** – Vehicles that are authorized in the AOA for emergency purposes (e.g., ambulances, aircraft rescue and fire fighting (ARFF) vehicles and emergency response vehicles) as authorized by the airport traffic control tower (ATCT) or an authorized on-site accident/incident commander.

d. **Airport Operations Vehicles –** Vehicles routinely used by airport operations personnel for airport inspection and duties associated with airfield operations (such as airfield condition reporting and Incident Command) on the AOA and Movement Area.

e. **Airport Security Vehicles –** Vehicles that are authorized in the AOA for security purposes, as needed (e.g. police cars).

f. Airfield Service Vehicles – Vehicles that are routinely used in the AOA for airfield service, maintenance, or construction (e.g. snow blowers, snowplows, maintenance trucks, and tractors).

g. Aircraft Support Vehicles – Vehicles that are routinely used in the AOA to support aircraft operations (e.g. aircraft pushback tractors, baggage/cargo tractors or trucks, air conditioning and aviation fuel trucks). These vehicles are typically owned by airlines, vendors, or contractors and are not eligible for Federal funding.

h. Reduced Visibility – Prevailing visibility is less than one statute mile (1609 meters) and/or the runway visual range (RVR) is less than 6,000 feet (1830 meters).

i. Movement Area – The runways, taxiways, and other areas of an airport/heliport that are used for taxiing/hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading ramps and parking areas. At those airports/heliports with an operating airport traffic control tower (ATCT), specific approval for entry onto the movement area must be obtained from air traffic control (ATC).

j. Other Vehicles – Vehicles that are not routinely authorized in the AOA (e.g. construction vehicles). These vehicles are typically owned by airlines, vendors, or contractors and are not eligible for Federal funding.

k. Peak Intensity – Peak intensity, for purposes of this document, means the maximum magnitude of luminescence as measured in candela.

l. Towbarless Tow Vehicle (TLTV) – a type of aircraft support vehicle whose main purpose is to tow aircraft in the AOA by way of nose gear capture.

3. VEHICLE PAINTING.

NOTE: *Airport vehicle paint and markings are a safety of flight requirement. The approved colors/markings herein assure conspicuity of vehicles operating in the AOA from both the ground and air.*

a. Airport Emergency Vehicles.

(1) Ambulances. Ambulance vehicles are painted per the most current version of Federal Specification KKK-A-1822, *Federal Specification for the Star-of-Life Ambulance*. Ambulances are not considered vehicles routinely operating on the AOA.

(2) Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Yellowish-green is the vehicle color standard. Color specifications are per Appendix A.

NOTE: *A yellowish-green color provides optimum visibility during all light levels encountered during a 24-hour day and under variations of light that result from weather and seasonal changes.*

b. Airport Operations Vehicles. Airport operations vehicles may be painted in colors designated by the airport operator. The characteristics must be coordinated with the respective ATCT and identified in the tower letter of agreement.

c. Airport Security Vehicles. Comply with specific state or local requirements.

d. Airfield Service Vehicles. Chrome yellow is the vehicle color standard. Color specifications are per Appendix A. When vehicles are equipped with bumper bars 8 inches (200 mm) or more in depth, the bars must be painted in alternate stripes 4 inches (100 mm) in width of chrome yellow and black inclined 45° to the vertical.

e. Aircraft Support Vehicles.

(1) Any color or combination of colors other than yellowish-green or chrome yellow. The bumper bar paint scheme in paragraph 3.d (of alternating chrome yellow and black stripe) is recommended.

(2) TLTVs. International orange is the vehicle color standard. Retroreflective tape covering more than 25 percent of the vehicle's vertical surfaces may be used as a temporary measure to meet this standard prior to scheduled vehicle painting.

f. Other Vehicles. Any color or combination of colors other than solid black or white.

4. VEHICLE MARKING.

a. Airport Emergency Vehicles.

(1) Ambulances. Ambulances are marked per the most current version of Federal Specification KKK-A-1822.

(2) ARFF Vehicles. Emergency rescue and fire fighting vehicles are marked with the letters "ARFF, "Fire," or "Rescue" and in accordance with 4.c.(1)-(5) of this AC.

b. Airport Operations Vehicles. Airport operations vehicles may be marked as designated by the airport operator. Marking must be coordinated with the respective ATCT and identified in the tower letter of agreement.

c. Airfield Service Vehicles and Aircraft Support Vehicles.

(1) Airport operator owned vehicles must display an identification number on each side and on the roof (the hood should be used if the vehicle has no roof).

(2) Side numbers will be a minimum of 16 inches (410 mm) in height and conspicuously located.

(3) Roof numbers will be a minimum of 24 inches (610 mm) in height and affixed with their bases toward the front of the vehicle. The identification numbers should provide sharp color contrast to the vehicle color.

(4) In addition to the identification numbers, airport operator-owned vehicles must display either the name of the airport and/or the airport insignia.

(5) To further improve night-time recognition of vehicles, a minimum 8 inch (200 mm) wide horizontal band of high gloss white paint or white reflective tape (Retroreflective, ASTM-D 4956-09, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Type III & above) must be used around the vehicle's surface. Figures 1, 2, and 3 show suggested locations for the horizontal reflective band.

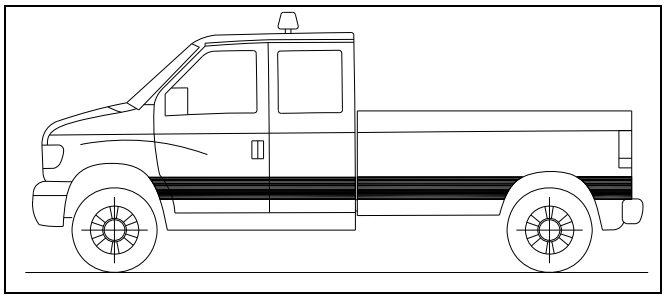

Figure 1: Suggested location for the horizontal reflective band, Option 1

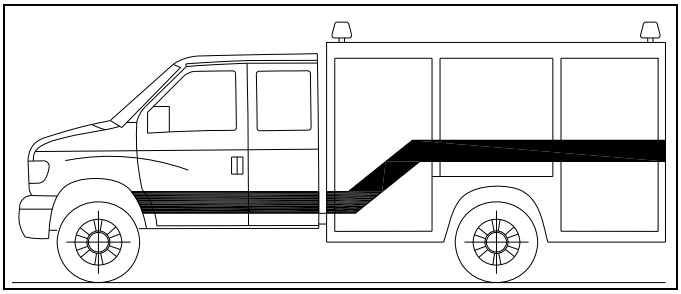

Figure 2: Suggested location for the horizontal reflective band, Option 2

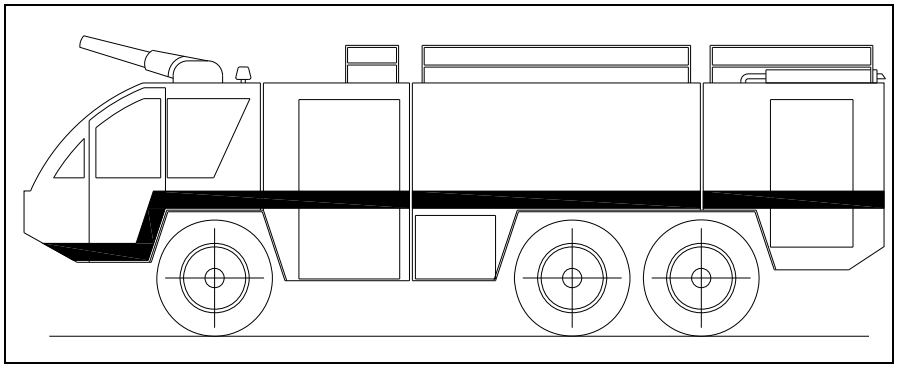

Figure 3: Suggested location for the horizontal reflective band, Option 3

(6) TLTVs. Retroreflective tape is used to outline the shape of a TLTV. If the vertical edge of the vehicle is rounded, the tape should be placed on the rounded portion to reflect light in both the horizontal and vertical planes. Where the placement of the tape may interfere with, or may be worn down by, maintenance or operational activities, tape is not required. Suggested locations for the retroreflective bands are shown in Figure 4.

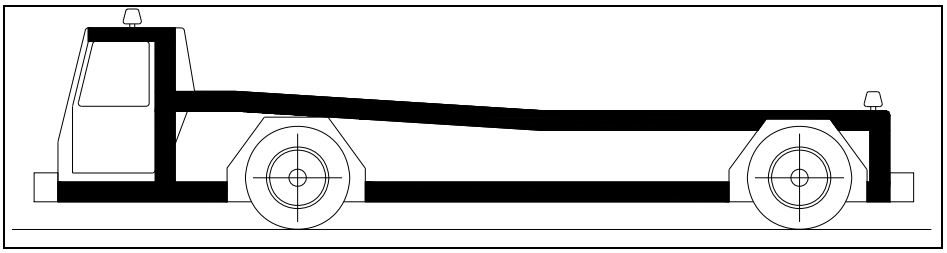

Figure 4: Suggested placement of retroreflective tape on a TLTV

d. Airport Security and Other Vehicles.

(1) Vehicles other than those that routinely traverse any portion of the AOA under the control of ATC, which are not escorted by a vehicle in constant two-way radio communication with ATC and properly equipped and authorized to operate in the AOA, must be provided with a flag on a staff attached to the vehicle so that the flag will be readily visible.

(2) At airports without air traffic control facilities, flags must be provided on all vehicles.

(3) The flag must be at least a 3-foot by 3-foot (0.9 meter by 0.9 meter) square having a checkered pattern of international orange and white squares at least 1 foot (300 mm) on each side (see Appendix A for the fabric color specification).

5. VEHICLE LIGHTING.

a. Airfield Service, Aircraft Support, and Airport Operations Vehicles.

(1) The standard for identification lighting is a yellow flashing light that is mounted on the uppermost part of the vehicle structure. A steady yellow light designates vehicles limited to non-movement areas.

(2) The light must be visible from any direction, day and night, including from the air.

(3) Color specifications for vehicle identification lights are per Appendix B.

(4) TLTVs. An LED light bar placed above the operator's cab may be used in place of the rotating yellow flashing light. In addition, a yellow flashing light (of any type) must be installed on the upper left-rear and right-rear corners of the TLTV, and must be activated when an aircraft is in tow. The size of the rear flashing lights must be large enough to meet the requirements of Section 5.c, but not so large as to interfere with the normal or towing operations of the TLTV.

b. Airport Emergency, Security, and Other Vehicles, which are not escorted by a properly lighted vehicle, must be identified during periods of low visibility by a light.

c. Characteristics of Flashing Lights:

(1) Ambulance lights must meet the specifications in the most current version of Federal Specification KKK-A-1822, and ARFF vehicles must meet NFPA, state, and local requirements.

(2) Lights must have peak intensity within the range of 40 to 400 candelas (effective) from 0^{o} (horizontal) up to 10^{o} above the horizontal and for 360^{o} horizontally. The upper limit of 400 candelas (effective) is necessary to avoid damage to night vision.

(3) From 10^{o} to 15^{o} above the horizontal plane, the light output must be $1/10^{th}$ of peak intensity or between 4 and 40 candelas (effective).

(4) Lights must flash at 75 ± 15 flashes per minute.

NOTES:

1. The effective intensity of a flashing light is equal to the intensity of a steady-burning (fixed) light of the same color that produces the same visual range under identical conditions of observation.

2. If xenon flashtubes are used, refer to AC 150/5345-43, Specification for Obstruction Lighting Equipment, for guidance concerning methods of calculating effective intensity.

d. Light Colors.

(1) Airport Emergency Vehicles.

(a) **Ambulances.** Per the most current version of Federal Specification KKK-A-1822.

(b) **ARFF Vehicles.** Red or a combination of red-and-white flashing lights per the chromaticity requirements in Appendix B.

(2) Airport Security Vehicles. Signal blue or a combination of red and signal blue flashing light per the chromaticity requirements in Appendix B.

(3) Airfield Service, Aircraft Support, Airport Operations, and Other Vehicles. Yellow flashing light per the chromaticity requirements in Appendix B.

APPENDIX A. COLOR SPECIFICATIONS

A-1. SPECIFICATIONS. Colors specified in Table A-1 are per the Commission Internationale de l'Eclairage (CIE) L*a*b* system of color specification. For a description of this system, refer to American Society for Testing & Materials (ASTM) D 2244, *Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.*

Table A-1. Specification for vehicle and flag colors

Standard Illuminant D65 Usage	Chrome Yellow			Yellowish-Green			International Orange		
	Vehicle Paint			Vehicle Paint			Vehicle Paint / Flag Fabric		
CIELAB DATA	**L***	**a***	**b***	**L***	**a***	**b***	**L***	**a***	**b***
Centroid Color	72.8	24.4	77.6	78.3	-10.2	80.4	45.0	53.5	52.0
Point 1	72.8	31.8	82.9	78.3	-9.0	92.0	45.0	61.4	47.8
Point 2	72.8	25.5	66.7	78.3	-7.6	73.2	45.0	53.9	41.4
Point 3	72.8	18.0	69.3	78.3	-11.0	69.3	45.0	53.5	53.4
Point 4	72.8	22.4	86.0	78.3	-13.4	86.2	45.0	49.7	60.4
Light Limit	77.8			83.3			49.9		
Dark Limit	67.8			73.3			41.6		
Max ΔE	11.1			11.7			10.7		

A-2. COLOR TESTS. Acceptable colors are those that meet the gloss rating test and either a visual or an instrumental color test as follows:

NOTE: *Flag fabric colors must meet either the instrumental tests in Table A-1 or the visual method described in paragraph A-2b(1).*

a. Gloss Rating Test. This test is performed per ASTM D 523, *Standard Test Method for Specular Gloss,* on a paint sample of the color to be applied on the vehicle. An acceptable color sample is high gloss with a minimum gloss rating of 70 units, for 60° geometry.

b. Color Test Methods:

(1) Visual. Prepare a master specimen of the color (per Table A-1) and gloss (per paragraph A-2a). This specimen will be the master color and be used as the basis of comparison per ASTM D 5531-05, *Standard Guide for the Preparation, Maintenance, and Distribution of Physical Product Standards for Color and Geometric Appearance of Coatings.* To verify the paint color of a vehicle visually, vehicle paint samples must be

prepared and viewed per ASTM D 1729-96 (Reapproved 2009), *Standard Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials.*

(2) Instrumental. This test requires a test specimen sample and reference to Table A-1. All test specimen measurements should be conducted per ASTM E 1164-09a *Standard Practice for Obtaining Spectrometric Data for Object-Color Evaluation.* Test specimen tolerances must be per Table A-1 per the following:

(a) Plot the centroid color using the a* and b* CIELAB coordinate data from Table A-1 on graph paper or by entry of the coordinate data into a computer program. Plot and connect points 1 through 4 from the same table to form a quadrilateral; noting that the centroid color is within this figure. See Figure A-1 for plots of all three color specifications in Table A-1.

(b) Perform color sample measurements per ASTM E 1164-09a. If necessary, convert measurements to CIELAB L*, a*, and b* color space. See ASTM E 308-08, *Standard Practice for Computing the Colors of Objects by Using the CIE System,* for color space conversion formulae.

(c) An acceptable color is one that meets:

(i) the chromaticity requirements of the color samples a* and b* CIELAB coordinate data by falling within the quadrilateral;

(ii) the L* data lightness requirement by falling within the range defined by the light and dark data of Table A-1;

(iii) the total color difference (ΔE) by not exceeding the limits in Table A-1 when the CIELAB data are computed in the following formula:

$$\Delta E = (\Delta L^{*2} + \Delta a^{*2} + \Delta b^{*2})^{\frac{1}{2}}$$

where ΔL*, Δa*, and Δb* values are the differences between those values for the centroid color in Table A-1 and those of the color sample measurements.

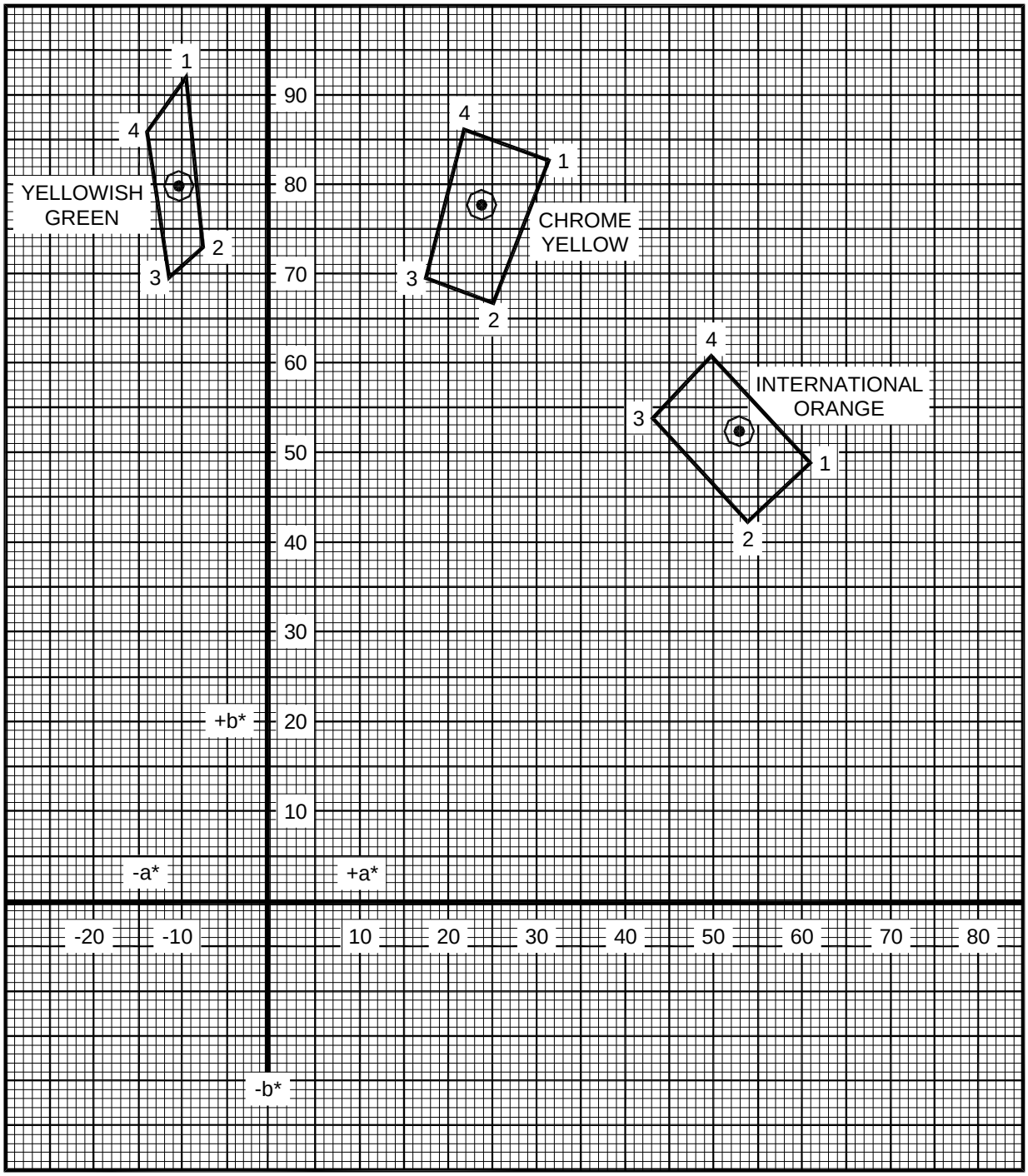

Figure A-1. Plot of selected color paint specifications

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APPENDIX B. COLOR SPECIFICATIONS FOR VEHICLE IDENTIFICATION LIGHTS

B-1. SPECIFICATIONS. The Society of Automotive Engineers (SAE) Standard J578 Revised December 2006, *Color Specification*, defines the acceptable color boundary limits and measurement of emitted red, white, signal blue, and yellow light for vehicle lights. This standard applies to the overall emitted color of light from the device in lieu of emitted light from any small area of the lens. The color of emitted light must fall within the color boundaries per SAE J578 Revised December 2006 (color boundary equations are in the standard) using color measurement methods detailed in the standard. See FAA Engineering Brief #67, Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures, for additional information and Alternative Lighting Devices.

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U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: Operational Safety on Airports During Construction	**Date:** 9/29/11 **Initiated by:** AAS-100	**AC No:** 150/5370-2F

1. Purpose. This AC sets forth guidelines for operational safety on airports during construction.

2. What this AC Cancels. This AC cancels AC 150/5370-2E, Operational Safety on Airports During Construction, dated January 17, 2003.

3. Whom This AC Affects. This AC assists airport operators in complying with Title 14 Code of Federal Regulations (CFR) Part 139, Certification of Airports (Part 139). For those certificated airports, this AC provides one way, but not the only way, of meeting those requirements. The use of this AC is mandatory for those airport construction projects receiving funds under the Airport Improvement Program (AIP) or the Passenger Facility Charge (PFC) Program. See Grant Assurance No. 34, "Policies, Standards, and Specifications," and PFC Assurance No. 9, "Standard and Specifications." While we do not require non-certificated airports without grant agreements to adhere to these guidelines, we recommend that they do so to help these airports maintain operational safety during construction.

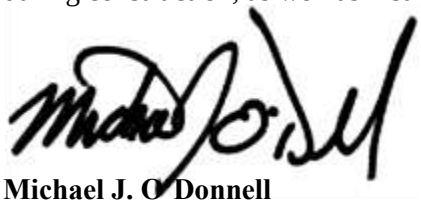
4. Principal Changes.

a. Construction activities are prohibited in safety areas while the associated runway or taxiway is open to aircraft.

b. Guidance is provided in incorporating Safety Risk Management.

c. Recommended checklists are provided for writing Construction Safety and Phasing Plans and for daily inspections.

5. Reading Material Related to this AC. Numerous ACs are referenced in the text of this AC. These references do not include a revision letter, as they are to be read as referring to the latest version. Appendix 1 contains a list of reading material on airport construction, design, and potential safety hazards during construction, as well as instructions for obtaining these documents.



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Chapter 1. Planning an Airfield Construction Project

101. Overview. Airports are complex environments, and procedures and conditions associated with construction activities often affect aircraft operations and can jeopardize operational safety. Safety considerations are paramount and may make operational impacts unavoidable. However, careful planning, scheduling, and coordination of construction activities can minimize disruption of normal aircraft operations and avoid situations that compromise the airport's operational safety. The airport operator must understand how construction activities and aircraft operations affect one another to be able to develop an effective plan to complete the project. While the guidance in this AC is primarily used for construction operations, some of the concepts, methods and procedures described may also enhance the day-to-day airport maintenance operations, such as lighting maintenance and snow removal operations.

102. Plan for Safety. Safety, maintaining aircraft operations, and construction costs are all interrelated. Since safety must not be compromised, the airport operator must strike a balance between maintaining aircraft operations and construction costs. This balance will vary widely depending on the operational needs and resources of the airport and will require early coordination with airport users and the FAA. As the project design progresses, the necessary construction locations, activities, and associated costs will be identified. As they are identified, their impact to airport operations must be assessed. Adjustments are made to the proposed construction activities, often by phasing the project, and/or to airport operations in order to maintain operational safety. This planning effort will ultimately result in a project Construction Safety and Phasing Plan (CSPP). The development of the CSPP takes place through the following five steps:

a. Identify Affected Areas. The airport operator must determine the geographic areas on the airport affected by the construction project. Some, such as a runway extension, will be defined by the project. Others may be variable, such as the location of haul routes and material stockpiles.

b. Describe Current Operations. Identify the normal airport operations in each affected area for each phase of the project. This becomes the baseline from which the impact on operations by construction activities can be measured. This should include a narrative of the typical users and aircraft operating within the affected areas. It should also include information related to airport operations: the Aircraft Reference Code (ACRC) for each runway; Airplane Design Group (ADG) and Taxiway Design Group (TDG)[1] for each affected taxiway; designated approach visibility minimums; available approach and departure procedures; most demanding aircraft; declared distances; available air traffic control services; airport Surface Movement Guidance and Control System plan; and others. The applicable seasons, days and times for certain operations should also be identified as applicable.

c. Allow for Temporary Changes to Operations. To the extent practical, current airport operations should be maintained during the construction. In consultation with airport users, Aircraft Rescue and Fire Fighting (ARFF) personnel, and FAA Air Traffic Organization (ATO) personnel, the airport operator should identify and prioritize the airport's most important operations. The construction activities should be planned, through project phasing if necessary, to safely accommodate these operations. When the construction activities cannot be adjusted to safely maintain current operations, regardless of their importance, then the operations must be revised accordingly. Allowable changes include temporary revisions to approach procedures, restricting certain aircraft to specific runways and taxiways, suspension of certain operations, decreased weights for some aircraft due to shortened runways,

[1] Taxiway Design Group will be introduced in AC 150/5300-13A.

and other changes. An example of a table showing temporary operations versus current operations is shown in Table 3-1 Sample Operations Effects.

d. Take Required Measures to Revised Operations. Once the level and type of aircraft operations to be maintained are identified, the airport operator must determine the measures required to safely conduct the planned operations during the construction. These measures will result in associated costs, which can be broadly interpreted to include not only direct construction costs, but also loss of revenue from impacted operations. Analysis of costs may indicate a need to reevaluate allowable changes to operations. As aircraft operations and allowable changes will vary so widely among airports, this AC presents general guidance on those subjects.

e. Manage Safety Risk. Certain airport projects may require the airport operator to provide a Project Proposal Summary to help the FAA to determine the appropriate level of Safety Risk Management (SRM) documentation. The airport operator must coordinate with the appropriate FAA Airports Regional or District Office early in the development of the CSPP to determine the need for SRM documentation. See FAA Order 5200.11, FAA Airports (ARP) Safety Management System (SMS), for more information. If the FAA requires SRM documentation, the airport operator must at a minimum:

(1) Notify the appropriate FAA Airports Regional or District Office during the project "scope development" phase of any project requiring a CSPP.

(2) Provide documents identified by the FAA as necessary to conduct SRM.

(3) Participate in the SRM process for airport projects.

(4) Provide a representative to participate on the SRM panel.

(5) Ensure that all applicable SRM identified risks elements are recorded and mitigated within the CSPP.

103. Develop a Construction Safety and Phasing Plan (CSPP). Development of an effective CSPP will require familiarity with many other documents referenced throughout this AC. See Appendix 1, Related Reading Material for a list of related reading material.

a. List Requirements. A CSPP must be developed for each on-airfield construction project funded by the Airport Improvement Program (AIP) or the Passenger Facility Charge (PFC) program or located on an airport certificated under Part 139. As per Order 5200.11, such projects do not include construction, rehabilitation, or change of any facility that is entirely outside the air operations area, does not involve any expansion of the facility envelope and does not involve construction equipment, haul routes or placement of material in locations that require access to the air operations area, increase the facility envelope, or impact line-of-sight. Such facilities may include passenger terminals and parking or other structures. However, extraordinary circumstances may trigger the need for a Safety Assessment and a CSPP. The CSPP is subject to subsequent review and approval under the FAA's Safety Risk Management procedures (see paragraph 102.e above). Additional information may be found in Order 5200.11.

b. Prepare a Safety Plan Compliance Document. The Safety Plan Compliance Document (SPCD) details how the contractor will comply with the CSPP. Also, it will not be possible to determine all safety plan details (for example specific hazard equipment and lighting, contractor's points of contact, construction equipment heights) during the development of the CSPP. The successful contractor must define such details by preparing an SPCD that the airport operator reviews for approval prior to issuance of a notice-to-proceed. The SPCD is a subset of the CSPP, similar to how a shop drawing review is a subset to the technical specifications.

c. Assume Responsibility for the CSPP. The airport operator is responsible for establishing and enforcing the CSPP. The airport operator may use the services of an engineering consultant to help develop the CSPP. However, writing the CSPP cannot be delegated to the construction contractor. Only those details the airport operator determines cannot be addressed before contract award are developed by the contractor and submitted for approval as the SPCD. The SPCD does not restate nor propose differences to provisions already addressed in the CSPP.

104. Who Is Responsible for Safety During Construction?

a. Establish a Safety Culture. Everyone has a role in operational safety on airports during construction: the airport operator, the airport's consultants, the construction contractor and subcontractors, airport users, airport tenants, ARFF personnel, Air Traffic personnel, including Technical Operations personnel, FAA Airports Division personnel, and others. Close communication and coordination between all affected parties is the key to maintaining safe operations. Such communication and coordination should start at the project scoping meeting and continue through the completion of the project. The airport operator and contractor should conduct onsite safety inspections throughout the project and immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

b. Assess Airport Operator's Responsibilities. An airport operator has overall responsibility for all activities on an airport, including construction. This includes the predesign, design, preconstruction, construction, and inspection phases. Additional information on the responsibilities listed below can be found throughout this AC. The airport operator must:

(1) Develop a CSPP that complies with the safety guidelines of Chapter 2, Construction Safety and Phasing Plans, and Chapter 3, Guidelines for Writing a CSPP. The airport operator may develop the CSPP internally or have a consultant develop the CSPP for approval by the airport operator. For tenant sponsored projects, approve a CSPP developed by the tenant or its consultant.

(2) Require, review and approve the SPCD by the contractor that indicates how it will comply with the CSPP and provides details that cannot be determined before contract award.

(3) Convene a preconstruction meeting with the construction contractor, consultant, airport employees and, if appropriate, tenant sponsor and other tenants to review and discuss project safety before beginning construction activity. The appropriate FAA representatives should be invited to attend the meeting. See AC 150/5300-9, *Predesign, Prebid, and Preconstruction Conferences for Airport Grant Projects.* (Note "FAA" refers to the Airports Regional or District Office, the Air Traffic Organization, Flight Standards Service, and other offices that support airport operations, flight regulations, and construction/environmental policies.)

(4) Ensure contact information is accurate for each representative/point of contact identified in the CSPP and SPCD.

(5) Hold weekly or, if necessary, daily safety meetings with all affected parties to coordinate activities.

(6) Notify users, ARFF personnel, and FAA ATO personnel of construction and conditions that may adversely affect the operational safety of the airport via Notices to Airmen (NOTAM) and other methods, as appropriate. Convene a meeting for review and discussion if necessary.

(7) Ensure construction personnel know of any applicable airport procedures and of changes to those procedures that may affect their work.

(8) Ensure construction contractors and subcontractors undergo training required by the CSPP and SPCD.

(9) Ensure vehicle and pedestrian operations addressed in the CSPP and SPCD are coordinated with airport tenants, the airport traffic control tower (ATCT), and construction contractors.

(10) At certificated airports, ensure each CSPP and SPCD is consistent with Part 139.

(11) Conduct inspections sufficiently frequently to ensure construction contractors and tenants comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

(12) Resolve safety deficiencies immediately. At airports subject to 49 CFR Part 1542, Airport Security, ensure construction access complies with the security requirements of that regulation.

(13) Notify appropriate parties when conditions exist that invoke provisions of the CSPP and SPCD (for example, implementation of low-visibility operations).

(14) Ensure prompt submittal of a Notice of Proposed Construction or Alteration (Form 7460-1) for conducting an aeronautical study of potential obstructions such as tall equipment (cranes, concrete pumps, other.), stock piles, and haul routes. A separate form may be filed for each potential obstruction, or one form may be filed describing the entire construction area and maximum equipment height. In the latter case, a separate form must be filed for any object beyond or higher than the originally evaluated area/height. The FAA encourages online submittal of forms for expediency. The appropriate FAA Airports Regional or District Office can provide assistance in determining which objects require an aeronautical study.

(15) Promptly notify the FAA Airports Regional or District Office of any proposed changes to the CSPP prior to implementation of the change. Changes to the CSPP require review and approval by the airport operator and the FAA. Coordinate with appropriate local and other federal government agencies, such as EPA, OSHA, TSA, and the state environmental agency.

c. Define Construction Contractor's Responsibilities. The contractor is responsible for complying with the CSPP and SPCD. The contractor must:

(1) Submit a Safety Plan Compliance Document (SPCD) to the airport operator describing how it will comply with the requirements of the CSPP and supplying any details that could not be determined before contract award. The SPCD must include a certification statement by the contractor that indicates it understands the operational safety requirements of the CSPP and it asserts it will not deviate from the approved CSPP and SPCD unless written approval is granted by the airport operator. Any construction practice proposed by the contractor that does not conform to the CSPP and SPCD may impact the airport's operational safety and will require a revision to the CSPP and SPCD and re-coordination with the airport operator and the FAA in advance.

(2) Have available at all times copies of the CSPP and SPCD for reference by the airport operator and its representatives, and by subcontractors and contractor employees.

(3) Ensure that construction personnel are familiar with safety procedures and regulations on the airport. Provide a point of contact who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport. Many projects will require 24-hour coverage.

(4) Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site whenever active construction is taking place.

(5) Conduct inspections sufficiently frequently to ensure construction personnel comply with the CSPP and SPCD and that there are no altered construction activities that could create potential safety hazards.

(6) Restrict movement of construction vehicles and personnel to permitted construction areas by flagging, barricading, erecting temporary fencing, or providing escorts, as appropriate and as specified in the CSPP and SPCD.

(7) Ensure that no contractor employees, employees of subcontractors or suppliers, or other persons enter any part of the air operations area (AOA) from the construction site unless authorized.

(8) Ensure prompt submittal through the airport operator of Form 7460-1 for the purpose of conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, other equipment), stock piles, and haul routes when different from cases previously filed by the airport operator. The FAA encourages online submittal of forms for expediency.

d. Define Tenant's Responsibilities if planning construction activities on leased property. Airport tenants, such as airline operators, fixed base operators, and FAA ATO/Technical Operations sponsoring construction must:

(1) Develop, or have a consultant develop, a project specific CSPP and submit it to the airport operator for certification and subsequent approval by the FAA. The approved CSPP must be made part of any contract awarded by the tenant for construction work.

(2) In coordination with its contractor, develop an SPCD and submit it to the airport operator for approval to be issued prior to issuance of a Notice to Proceed.

(3) Ensure that construction personnel are familiar with safety procedures and regulations on the airport.

(4) Provide a point of contact of who will coordinate an immediate response to correct any construction-related activity that may adversely affect the operational safety of the airport.

(5) Identify in the SPCD the contractor's on-site employees responsible for monitoring compliance with the CSPP and SPCD during construction. At least one of these employees must be on-site whenever active construction is taking place.

(6) Ensure that no tenant or contractor employees, employees of subcontractors or suppliers, or any other persons enter any part of the AOA from the construction site unless authorized.

(7) Restrict movement of construction vehicles to construction areas by flagging and barricading, erecting temporary fencing, or providing escorts, as appropriate, and as specified in the CSPP and SPCD.

(8) Ensure prompt submittal through the airport operator of Form 7460-1 for the purpose of conducting an aeronautical study of contractor equipment such as tall equipment (cranes, concrete pumps, other.), stock piles, and haul routes. The FAA encourages online submittal of forms for expediency.

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Chapter 2. Construction Safety and Phasing Plans

Section 1. Basic Considerations

201. Overview. Aviation safety is the primary consideration at airports, especially during construction. The airport operator's Construction Safety and Phasing Plan (CSPP) and the contractor's Safety Plan Compliance Document (SPCD) are the primary tools to ensure safety compliance when coordinating construction activities with airport operations. These documents identify all aspects of the construction project that pose a potential safety hazard to airport operations and outline respective mitigation procedures for each hazard. They must provide all information necessary for the Airport Operations department to conduct airfield inspections and expeditiously identify and correct unsafe conditions during construction. All aviation safety provisions included within the project drawings, contract specifications, and other related documents must also be reflected in the CSPP and SPCD.

202. Assume Responsibility. Operational safety on the airport remains the airport operator's responsibility at all times. The airport operator must develop, certify, and submit for FAA approval each CSPP. It is the airport operator's responsibility to apply the requirements of the FAA approved CSPP. The airport operator must revise the CSPP when conditions warrant changes and must submit the revised CSPP to the FAA for approval. The airport operator must also require and approve a SPCD from the project contractor.

203. Submit the CSPP. Construction Safety and Phasing Plans should be developed concurrently with the project design. Milestone versions of the CSPP should be submitted for review and approval as follows. While these milestones are not mandatory, early submission will help to avoid delays. Submittals are preferred in 8.5 x 11 in or 11 x 17 in format for compatibility with the FAA's Obstruction Evaluation / Airport Airspace Analysis (OE / AAA) process.

a. Submit an Outline/Draft. By the time approximately 25% to 30% of the project design is completed, the principal elements of the CSPP should be established. Airport operators are encouraged to submit an outline or draft, detailing all CSPP provisions developed to date, to the FAA for review at this stage of the project design.

b. Submit a Construction Safety and Phasing Plan (CSPP). The CSPP should be formally submitted for FAA approval when the project design is 80% to 90% complete. Since provisions in the CSPP will influence contract costs, it is important to obtain FAA approval in time to include all such provisions in the procurement contract.

c. Submit a Safety Plan Compliance Document (SPCD). The contractor should submit the SPCD to the airport operator for approval to be issued prior to the Notice to Proceed.

d. Submit CSPP Revisions. All revisions to the CSPP or SPCD should be submitted to the FAA for approval as soon as required changes are identified.

204. Meet CSPP Requirements.

a. To the extent possible, the CSPP should address the following as outlined in Section 2, Plan Requirements and Chapter 3, Guidelines for Writing a CSPP, as appropriate. Details that cannot be determined at this stage are to be included in the SPCD.

(1) Coordination.

(a) Contractor progress meetings.

(b) Scope or schedule changes.

(c) FAA ATO coordination.

(2) Phasing.

(a) Phase elements.

(b) Construction safety drawings

(3) Areas and operations affected by the construction activity.

(a) Identification of affected areas.

(b) Mitigation of effects.

(4) Protection of navigation aids (NAVAIDs).

(5) Contractor access.

(a) Location of stockpiled construction materials.

(b) Vehicle and pedestrian operations.

(6) Wildlife management.

(a) Trash.

(b) Standing water.

(c) Tall grass and seeds.

(d) Poorly maintained fencing and gates.

(e) Disruption of existing wildlife habitat.

(7) Foreign Object Debris (FOD) management.

(8) Hazardous materials (HAZMAT) management

(9) Notification of construction activities.

(a) Maintenance of a list of responsible representatives/ points of contact.

(b) Notices to Airmen (NOTAM).

(c) Emergency notification procedures.

(d) Coordination with ARFF Personnel.

(e) Notification to the FAA.

(10) Inspection requirements.

(a) Daily (or more frequent) inspections.

(b) Final inspections.

(11) Underground utilities.

(12) Penalties.

(13) Special conditions.

(14) Runway and taxiway visual aids. Marking, lighting, signs, and visual NAVAIDs.

(a) General.

(b) Markings.

(c) Lighting and visual NAVAIDs.

(d) Signs.

(15) Marking and signs for access routes.

(16) Hazard marking and lighting.

(a) Purpose.

(b) Equipment.

(17) Protection. Of runway and taxiway safety areas, object free areas, obstacle free zones, and approach/departure surfaces

(a) Runway Safety Area (RSA).

(b) Runway Object Free Area (ROFA).

(c) Taxiway Safety Area (TSA).

(d) Taxiway Object Free Area (TOFA).

(e) Obstacle Free Zone (OFZ).

(f) Runway approach/departure surfaces.

(18) Other limitations on construction.

(a) Prohibitions.

(b) Restrictions.

b. The Safety Plan Compliance Document (SPCD) should include a general statement by the construction contractor that he/she has read and will abide by the CSPP. In addition, the SPCD must include all supplemental information that could not be included in the CSPP prior to the contract award. The contractor statement should include the name of the contractor, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (that is, "I , Name of Contractor , have read the Title of Project CSPP, approved on Date , and will abide by it as written and with the following additions as noted:"). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not duplicate information in the CSPP:

(1) Coordination. Discuss details of proposed safety meetings with the airport operator and with contractor employees and subcontractors.

(2) Phasing. Discuss proposed construction schedule elements, including:

(a) Duration of each phase.

(b) Daily start and finish of construction, including "night only" construction.

(c) Duration of construction activities during:

(i) Normal runway operations.

(ii) Closed runway operations.

(iii) Modified runway "Aircraft Reference Code" usage.

(3) Areas and operations affected by the construction activity. These areas and operations should be identified in the CSPP and should not require an entry in the SPCD.

(4) Protection of NAVAIDs. Discuss specific methods proposed to protect operating NAVAIDs.

(5) Contractor access. Provide the following:

(a) Details on how the contractor will maintain the integrity of the airport security fence (gate guards, daily log of construction personnel, and other).

(b) Listing of individuals requiring driver training (for certificated airports and as requested).

(c) Radio communications.

(i) Types of radios and backup capabilities.

(ii) Who will be monitoring radios.

(iii) Whom to contact if the ATCT cannot reach the contractor's designated person by radio.

(d) Details on how the contractor will escort material delivery vehicles.

(6) Wildlife management. Discuss the following:

(a) Methods and procedures to prevent wildlife attraction.

(b) Wildlife reporting procedures.

(7) Foreign Object Debris (FOD) management. Discuss equipment and methods for control of FOD, including construction debris and dust.

(8) Hazardous material (HAZMAT) management. Discuss equipment and methods for responding to hazardous spills.

(9) Notification of construction activities. Provide the following:

(a) Contractor points of contact.

(b) Contractor emergency contact.

(c) Listing of tall or other requested equipment proposed for use on the airport and the timeframe for submitting 7460-1 forms not previously submitted by the airport operator.

(d) Batch plant details, including 7460-1 submittal.

(10) Inspection requirements. Discuss daily (or more frequent) inspections and special inspection procedures.

(11) Underground utilities. Discuss proposed methods of identifying and protecting underground utilities.

(12) Penalties. Penalties should be identified in the CSPP and should not require an entry in the SPCD.

(13) Special conditions. Discuss proposed actions for each special condition identified in the CSPP.

(14) Runway and taxiway visual aids. Including marking, lighting, signs, and visual NAVAIDs. Discuss proposed visual aids including the following:

(a) Equipment and methods for covering signage and airfield lights.

(b) Equipment and methods for temporary closure markings (paint, fabric, other).

(c) Types of temporary Visual Guidance Slope Indicators (VGSI).

(15) Marking and signs for access routes. Discuss proposed methods of demarcating access routes for vehicle drivers.

(16) Hazard marking and lighting. Discuss proposed equipment and methods for identifying excavation areas.

(17) Protection of runway and taxiway safety areas. including object free areas, obstacle free zones, and approach/departure surfaces. Discuss proposed methods of identifying, demarcating, and protecting airport surfaces including:

(a) Equipment and methods for maintaining Taxiway Safety Area standards.

(b) Equipment and methods for separation of construction operations from aircraft operations, including details of barricades.

(18) Other limitations on construction should be identified in the CSPP and should not require an entry in the SPCD.

Section 2. Plan Requirements

205. Coordination. Airport operators, or tenants conducting construction on their leased properties, should use predesign, prebid, and preconstruction conferences to introduce the subject of airport operational safety during construction (see AC 150/5300-9). In addition, the following should be coordinated as required:

a. Contractor Progress Meetings. Operational safety should be a standing agenda item for discussion during progress meetings throughout the project.

b. Scope or Schedule Changes. Changes in the scope or duration of the project may necessitate revisions to the CSPP and review and approval by the airport operator and the FAA.

c. FAA ATO Coordination. Early coordination with FAA ATO is required to schedule airway facility shutdowns and restarts. Relocation or adjustments to NAVAIDs, or changes to final grades in critical areas, may require an FAA flight inspection prior to restarting the facility. Flight inspections must be coordinated and scheduled well in advance of the intended facility restart. Flight inspections may require a reimbursable agreement between the airport operator and FAA ATO. Reimbursable agreements should be coordinated a minimum of 12 months prior to the start of construction. (See 213.e(3)(b) for required FAA notification regarding FAA owned NAVAIDs.)

206. Phasing. Once it has been determined what types and levels of airport operations will be maintained, the most efficient sequence of construction may not be feasible. In such a case, the sequence of construction may be phased to gain maximum efficiency while allowing for the required operations. The development of the resulting construction phases should be coordinated with local Air Traffic personnel and airport users. The sequenced construction phases established in the CSPP must be incorporated into the project design and must be reflected in the contract drawings and specifications.

a. Phase Elements. For each phase the CSPP should detail:

- Areas closed to aircraft operations

- Duration of closures
- Taxi routes
- ARFF access routes
- Construction staging areas
- Construction access and haul routes
- Impacts to NAVAIDs
- Lighting and marking changes
- Available runway length
- Declared distances (if applicable)
- Required hazard marking and lighting
- Lead times for required notifications

b. Construction Safety Drawings. Drawings specifically indicating operational safety procedures and methods in affected areas (that is, construction safety drawings) should be developed for each construction phase. Such drawings should be included in the CSPP as referenced attachments and should likewise be included in the contract drawing package.

207. Areas and Operations Affected by Construction Activity. Runways and taxiways should remain in use by aircraft to the maximum extent possible without compromising safety. Pre-meetings with the FAA Air Traffic Organization (ATO) will support operational simulations. See Chapter 3 for an example of a table showing temporary operations versus current operations.

a. Identification of Affected Areas. Identifying areas and operations affected by the construction will help to determine possible safety problems. The affected areas should be indentified in the construction safety drawings for each construction phase. (See 206.b above.) Of particular concern are:

(1) Closing, or partial closing, of runways, taxiways and aprons. When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing, landing, or taking off in either direction on that pavement is prohibited. A displaced threshold, by contrast, is established to ensure obstacle clearance and adequate safety area for landing aircraft. The pavement prior to the displaced threshold is available for take-off in the direction of the displacement and for landing and taking off in the opposite direction. Misunderstanding this difference, and issuance of a subsequently inaccurate NOTAM, can lead to a hazardous condition.

(2) Closing of Aircraft Rescue and Fire Fighting access routes.

(3) Closing of access routes used by airport and airline support vehicles.

(4) Interruption of utilities, including water supplies for fire fighting.

(5) Approach/departure surfaces affected by heights of objects.

(6) Construction areas, storage areas, and access routes near runways, taxiways, aprons, or helipads.

b. Mitigation of Effects. Establishment of specific procedures is necessary to maintain the safety and efficiency of airport operations. The CSPP must address:

(1) Temporary changes to runway and/or taxi operations.

(2) Detours for ARFF and other airport vehicles.

(3) Maintenance of essential utilities.

(4) Temporary changes to air traffic control procedures. Such changes must be coordinated with the ATO.

208. Navigation Aid (NAVAID) Protection. Before commencing construction activity, parking vehicles, or storing construction equipment and materials near a NAVAID, coordinate with the appropriate FAA ATO/Technical Operations office to evaluate the effect of construction activity and the required distance and direction from the NAVAID. (See paragraph 213.e(3) below.) Construction activities, materials/equipment storage, and vehicle parking near electronic NAVAIDs require special consideration since they may interfere with signals essential to air navigation. If any NAVAID may be affected, the CSPP and SPCD must show an understanding of the "critical area" associated with each NAVAID and describe how it will be protected. Where applicable, the operational critical areas of NAVAIDs should be graphically delineated on the project drawings. Pay particular attention to stockpiling material, as well as to movement and parking of equipment that may interfere with line of sight from the ATCT or with electronic emissions. Interference from construction equipment and activities may require NAVAID shutdown or adjustment of instrument approach minimums for low visibility operations. This condition requires that a NOTAM be filed (see paragraph 213.b below). Construction activities and materials/equipment storage near a NAVAID must not obstruct access to the equipment and instruments for maintenance. Submittal of a 7460-1 form is required for construction vehicles operating near FAA NAVAIDs. (See paragraph 213.e(1) below.)

209. Contractor Access. The CSPP must detail the areas to which the contractor must have access, and explain how contractor personnel will access those areas. Specifically address:

a. Location of Stockpiled Construction Materials. Stockpiled materials and equipment storage are not permitted within the RSA and OFZ, and if possible should not be permitted within the Object Free Area (OFA) of an operational runway. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval. The airport operator must ensure that stockpiled materials and equipment adjacent to these areas are prominently marked and lighted during hours of restricted visibility or darkness. (See paragraph 218.b below.) This includes determining and verifying that materials are stabilized and stored at an approved location so as not to be a hazard to aircraft operations and to prevent attraction of wildlife and foreign object damage. See paragraphs 210 and 211 below.

b. Vehicle and Pedestrian Operations. The CSPP should include specific vehicle and pedestrian requirements. Vehicle and pedestrian access routes for airport construction projects must be controlled to prevent inadvertent or unauthorized entry of persons, vehicles, or animals onto the AOA. The airport operator should coordinate requirements for vehicle operations with airport tenants, contractors, and the FAA air traffic manager. In regard to vehicle and pedestrian operations, the CSPP should include the following, and detail associated training requirements:

(1) Construction site parking. Designate in advance vehicle parking areas for contractor employees to prevent any unauthorized entry of persons or vehicles onto the AOA. These areas should provide reasonable contractor employee access to the job site.

(2) Construction equipment parking. Contractor employees must park and service all construction vehicles in an area designated by the airport operator outside the OFZ and never in the safety area of an active runway or taxiway. Unless a complex setup procedure makes movement of specialized equipment infeasible, inactive equipment must not be parked on a closed taxiway or runway. If it is necessary to leave specialized equipment on a closed taxiway or runway at night, the equipment must be well lighted. Employees should also park construction vehicles outside the OFA when not in use by

construction personnel (for example, overnight, on weekends, or during other periods when construction is not active). Parking areas must not obstruct the clear line of sight by the ATCT to any taxiways or runways under air traffic control nor obstruct any runway visual aids, signs, or navigation aids. The FAA must also study those areas to determine effects on airport design criteria, surfaces established by 14 CFR Part 77, Safe, Efficient Use, and Preservation of the Navigable Airspace (Part 77), and on NAVAIDs and Instrument Approach Procedures (IAP). See paragraph 213.e(1) below for further information.

(3) Access and haul roads. Determine the construction contractor's access to the construction sites and haul roads. Do not permit the construction contractor to use any access or haul roads other than those approved. Access routes used by contractor vehicles must be clearly marked to prevent inadvertent entry to areas open to airport operations. Pay special attention to ensure that if construction traffic is to share or cross any ARFF routes that ARFF right of way is not impeded at any time, and that construction traffic on haul roads does not interfere with NAVAIDs or approach surfaces of operational runways.

(4) Marking and lighting of vehicles in accordance with AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport.

(5) Description of proper vehicle operations on various areas under normal, lost communications, and emergency conditions.

(6) Required escorts.

(7) Training requirements for vehicle drivers to ensure compliance with the airport operator's vehicle rules and regulations. Specific training should be provided to those vehicle operators providing escorts. See AC 150/5210-20, Ground Vehicle Operations on Airports, for information on training and records maintenance requirements.

(8) Situational awareness. Vehicle drivers must confirm by personal observation that no aircraft is approaching their position (either in the air or on the ground) when given clearance to cross a runway, taxiway, or any other area open to airport operations. In addition, it is the responsibility of the escort vehicle driver to verify the movement/position of all escorted vehicles at any given time.

(9) Two-way radio communication procedures.

(a) General. The airport operator must ensure that tenant and construction contractor personnel engaged in activities involving unescorted operation on aircraft movement areas observe the proper procedures for communications, including using appropriate radio frequencies at airports with and without ATCT. When operating vehicles on or near open runways or taxiways, construction personnel must understand the critical importance of maintaining radio contact, as directed by the airport operator, with:

(i) Airport operations

(ii) ATCT

(iii) Common Traffic Advisory Frequency (CTAF), which may include UNICOM, MULTICOM.

(iv) Automatic Terminal Information Service (ATIS). This frequency is useful for monitoring conditions on the airport. Local air traffic will broadcast information regarding construction related runway closures and "shortened" runways on the ATIS frequency.

(b) Areas requiring two-way radio communication with the ATCT. Vehicular traffic crossing active movement areas must be controlled either by two-way radio with the ATCT, escort, flagman, signal light, or other means appropriate for the particular airport.

(c) Frequencies to be used. The airport operator will specify the frequencies to be used by the contractor, which may include the CTAF for monitoring of aircraft operations. Frequencies may also be assigned by the airport operator for other communications, including any radio frequency in compliance with Federal Communications Commission requirements. At airports with an ATCT, the airport operator will specify the frequency assigned by the ATCT to be used between contractor vehicles and the ATCT.

(d) Proper radio usage, including read back requirements.

(e) Proper phraseology, including the International Phonetic Alphabet.

(f) Light gun signals. Even though radio communication is maintained, escort vehicle drivers must also familiarize themselves with ATCT light gun signals in the event of radio failure. See the FAA safety placard "Ground Vehicle Guide to Airport Signs and Markings." This safety placard may be downloaded through the Runway Safety Program Web site at http://www.faa.gov/airports/runway_safety/publications/ (See "Signs & Markings Vehicle Dashboard Sticker".) or obtained from the FAA Airports Regional Office.

(10) Maintenance of the secured area of the airport, including:

(a) Fencing and gates. Airport operators and contractors must take care to maintain security during construction when access points are created in the security fencing to permit the passage of construction vehicles or personnel. Temporary gates should be equipped so they can be securely closed and locked to prevent access by animals and unauthorized people. Procedures should be in place to ensure that only authorized persons and vehicles have access to the AOA and to prohibit "piggybacking" behind another person or vehicle. The Department of Transportation (DOT) document DOT/FAA/AR-00/52, Recommended Security Guidelines for Airport Planning and Construction, provides more specific information on fencing. A copy of this document can be obtained from the Airport Consultants Council, Airports Council International, or American Association of Airport Executives.

(b) Badging requirements.

(c) Airports subject to 49 CFR Part 1542, Airport Security, must meet standards for access control, movement of ground vehicles, and identification of construction contractor and tenant personnel.

210. Wildlife Management. The CSPP and SPCD must be in accordance with the airport operator's wildlife hazard management plan, if applicable. See also AC 150/5200-33, Hazardous Wildlife Attractants On or Near Airports, and Certalert 98-05, Grasses Attractive to Hazardous Wildlife. Construction contractors must carefully control and continuously remove waste or loose materials that might attract wildlife. Contractor personnel must be aware of and avoid construction activities that can create wildlife hazards on airports, such as:

a. Trash. Food scraps must be collected from construction personnel activity.

b. Standing Water.

c. Tall Grass and Seeds. Requirements for turf establishment can be at odds with requirements for wildlife control. Grass seed is attractive to birds. Lower quality seed mixtures can contain seeds of plants (such as clover) that attract larger wildlife. Seeding should comply with the guidance in AC 150/5370-10, Standards for Specifying Construction of Airports, Item T-901, Seeding. Contact the local office of the United Sates Department of Agriculture Soil Conservation Service or the State University Agricultural Extension Service (County Agent or equivalent) for assistance and recommendations. These agencies can also provide liming and fertilizer recommendations.

d. Poorly Maintained Fencing and Gates. See 209.b(10)(a) above.

e. Disruption of Existing Wildlife Habitat. While this will frequently be unavoidable due to the nature of the project, the CSPP should specify under what circumstances (location, wildlife type) contractor personnel should immediately notify the airport operator of wildlife sightings.

211. Foreign Object Debris (FOD) Management. Waste and loose materials, commonly referred to as FOD, are capable of causing damage to aircraft landing gears, propellers, and jet engines. Construction contractors must not leave or place FOD on or near active aircraft movement areas. Materials capable of creating FOD must be continuously removed during the construction project. Fencing (other than security fencing) may be necessary to contain material that can be carried by wind into areas where aircraft operate. See AC 150/5210-24, Foreign Object Debris (FOD) Management.

212. Hazardous Materials (HAZMAT) Management. Contractors operating construction vehicles and equipment on the airport must be prepared to expeditiously contain and clean-up spills resulting from fuel or hydraulic fluid leaks. Transport and handling of other hazardous materials on an airport also requires special procedures. See AC 150/5320-15, Management of Airport Industrial Waste.

213. Notification of Construction Activities. The CSPP and SPCD must detail procedures for the immediate notification of airport users and the FAA of any conditions adversely affecting the operational safety of the airport. It must address the notification actions described below, as applicable.

a. List of Responsible Representatives/ points of contact for all involved parties, and procedures for contacting each of them, including after hours.

b. NOTAMs. Only the airport operator may initiate or cancel NOTAMs on airport conditions, and is the only entity that can close or open a runway. The airport operator must coordinate the issuance, maintenance, and cancellation of NOTAMs about airport conditions resulting from construction activities with tenants and the local air traffic facility (control tower, approach control, or air traffic control center), and must provide information on closed or hazardous conditions on airport movement areas to the FAA Flight Service Station (FSS) so it can issue a NOTAM. The airport operator must file and maintain a list of authorized representatives with the FSS. Refer to AC 150/5200-28, Notices to Airmen (NOTAMs) for Airport Operators, for a sample NOTAM form. Only the FAA may issue or cancel NOTAMs on shutdown or irregular operation of FAA owned facilities. Any person having reason to believe that a NOTAM is missing, incomplete, or inaccurate must notify the airport operator. See paragraph 207.a(1) above regarding issuing NOTAMs for partially closed runways versus runways with displaced thresholds.

c. Emergency notification procedures for medical, fire fighting, and police response.

d. Coordination with ARFF. The CSPP must detail procedures for coordinating through the airport sponsor with ARFF personnel, mutual aid providers, and other emergency services if construction requires:

- The deactivation and subsequent reactivation of water lines or fire hydrants, or
- The rerouting, blocking and restoration of emergency access routes, or
- The use of hazardous materials on the airfield.

e. Notification to the FAA.

(1) Part 77. Any person proposing construction or alteration of objects that affect navigable airspace, as defined in Part 77, must notify the FAA. This includes construction equipment and proposed

parking areas for this equipment (i.e. cranes, graders, other equipment) on airports. FAA Form 7460-1, Notice of Proposed Construction or Alteration, can be used for this purpose and submitted to the appropriate FAA Airports Regional or District Office. See Appendix 1, Related Reading Material, to download the form. Further guidance is available on the FAA web site at oeaaa.faa.gov.

(2) Part 157. With some exceptions, Title 14 CFR Part 157, Notice of Construction, Alteration, Activation, and Deactivation of Airports, requires that the airport operator notify the FAA in writing whenever a non-Federally funded project involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport. Notification involves submitting FAA Form 7480-1, Notice of Landing Area Proposal, to the nearest FAA Airports Regional or District Office. See Appendix 1, Related Reading Material to download the form.

(3) NAVAIDS. For emergency (short-notice) notification about impacts to both airport owned and FAA owned NAVAIDs, contact: 866-432-2622.

(a) Airport owned/FAA maintained. If construction operations require a shutdown of more than 24 hours, or more than 4 hours daily on consecutive days, of a NAVAID owned by the airport but maintained by the FAA, provide a 45-day minimum notice to FAA ATO/Technical Operations prior to facility shutdown.

(b) FAA owned.

(i) General. The airport operator must notify the appropriate FAA ATO Service Area Planning and Requirements (P&R) Group a minimum of 45 days prior to implementing an event that causes impacts to NAVAIDs. (Impacts to FAA equipment covered by a Reimbursable Agreement (RA) do not have to be reported by the airport operator.)

(ii) Coordinate work for an FAA owned NAVAID shutdown with the local FAA ATO/Technical Operations office, including any necessary reimbursable agreements and flight checks. Detail procedures that address unanticipated utility outages and cable cuts that could impact FAA NAVAIDs. In addition, provide seven days notice to schedule the actual shutdown.

214. Inspection Requirements.

a. Daily Inspections. Inspections should be conducted at least daily, but more frequently if necessary to ensure conformance with the CSPP. A sample checklist is provided in Appendix 3, Safety and Phasing Plan Checklist. See also AC 150/5200-18, Airport Safety Self-Inspection.

b. Final Inspections. New runways and extended runway closures may require safety inspections at certificated airports prior to allowing air carrier service. Coordinate with the FAA Airport Certification Safety Inspector (ACSI) to determine if a final inspection will be necessary.

215. Underground Utilities. The CSPP and/or SPCD must include procedures for locating and protecting existing underground utilities, cables, wires, pipelines, and other underground facilities in excavation areas. This may involve coordinating with public utilities and FAA ATO/Technical Operations. Note that “One Call” or “Miss Utility” services do not include FAA ATO/Technical Operations

216. Penalties. The CSPP should detail penalty provisions for noncompliance with airport rules and regulations and the safety plans (for example, if a vehicle is involved in a runway incursion). Such penalties typically include rescission of driving privileges or access to the AOA.

217. Special Conditions. The CSPP must detail any special conditions that affect the operation of the

airport and will require the activation of any special procedures (for example, low-visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, Vehicle / Pedestrian Deviation (VPD) and other activities requiring construction suspension/resumption).

218. Runway and Taxiway Visual Aids. Includes marking, lighting, signs, and visual NAVAIDS. The CSPP must ensure that areas where aircraft will be operating are clearly and visibly separated from construction areas, including closed runways. Throughout the duration of the construction project, verify that these areas remain clearly marked and visible at all times and that marking, lighting, signs, and visual NAVAIDs remain in place and operational. The CSPP must address the following, as appropriate:

a. General. Airport markings, lighting, signs, and visual NAVAIDs must be clearly visible to pilots, not misleading, confusing, or deceptive. All must be secured in place to prevent movement by prop wash, jet blast, wing vortices, or other wind currents and constructed of materials that would minimize damage to an aircraft in the event of inadvertent contact.

b. Markings. Markings must be in compliance with the standards of AC 150/5340-1, Standards for Airport Markings. Runways and runway exit taxiways closed to aircraft operations are marked with a yellow X. The preferred visual aid to depict temporary runway closure is the lighted X signal placed on or near the runway designation numbers. (See paragraph 218.b(1)(b) below.)

(1) Closed Runways and Taxiways.

(a) Permanently Closed Runways. For runways, obliterate the threshold marking, runway designation marking, and touchdown zone markings, and place Xs at each end and at 1,000-foot (300 m) intervals.

(b) Temporarily Closed Runways. For runways that have been temporarily closed, place an X at the each end of the runway directly on or as near as practicable to the runway designation numbers. Figure 2-1 illustrates.

Figure 2-1 Markings for a Temporarily Closed Runway

(c) Partially Closed Runways and Displaced Thresholds. When threshold markings are needed to identify the temporary beginning of the runway that is available for landing, the markings must comply with AC 150/5340-1. An X is not used on a partially closed runway or a runway with a displaced threshold. See paragraph 207.a(1) above for the difference between partially closed runways and runways with displaced thresholds.

(i) Partially Closed Runways. Pavement markings for temporary closed portions of the runway consist of a runway threshold bar and yellow chevrons to identify pavement areas that are unsuitable for takeoff or landing (see AC 150/5340-1).

(ii) Displaced Thresholds. Pavement markings for a displaced threshold consist of a runway threshold bar and white arrowheads with and without arrow shafts. These markings are required to identify the portion of the runway before the displaced threshold to provide centerline guidance for pilots during approaches, takeoffs, and landing rollouts from the opposite direction. See AC 150/5340-1.

(d) Taxiways.

(i) Permanently Closed Taxiways. AC 150/5300-13 notes that it is preferable to remove the pavement, but for pavement that is to remain, place an X at the entrance to both ends of the closed section. Obliterate taxiway centerline markings, including runway leadoff lines, leading to the closed taxiway. Figure 2-2 illustrates.

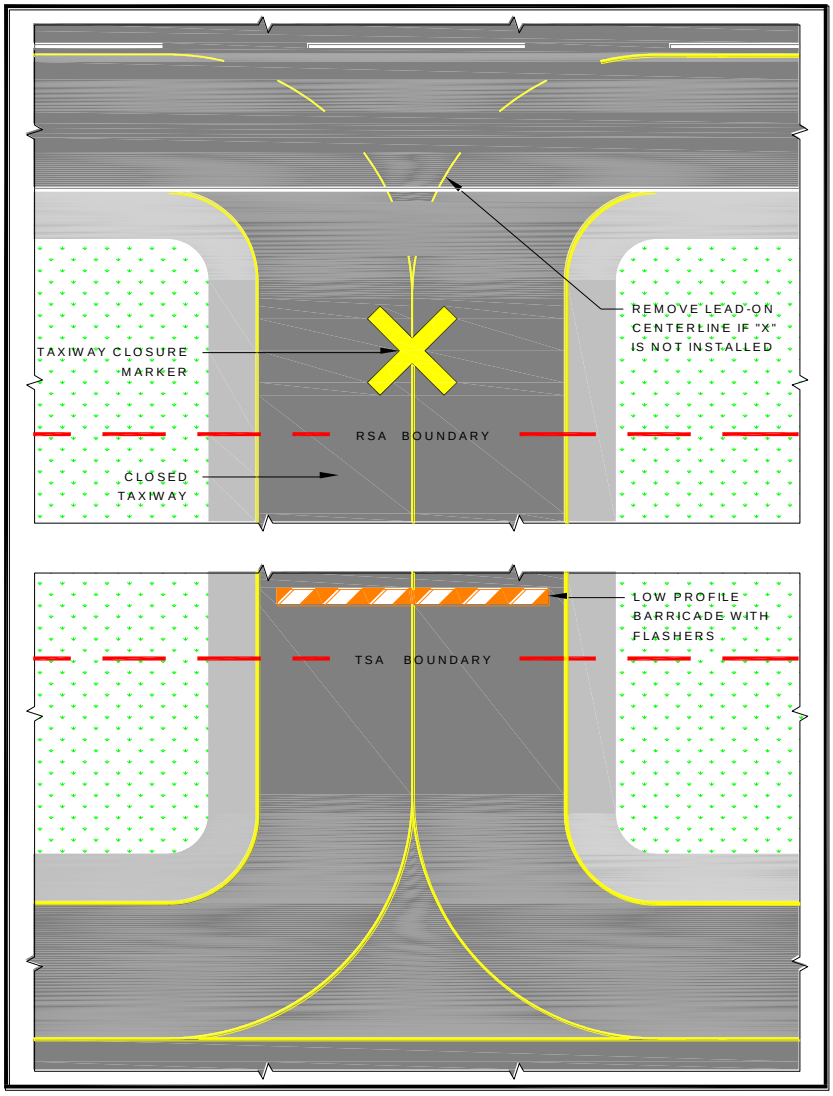

Figure 2-2 Taxiway Closure

(ii) Temporarily Closed Taxiways. Place barricades outside the safety area of intersecting taxiways. For runway/taxiway intersections, place an X at the entrance to the closed taxiway from the runway. If the taxiway will be closed for an extended period, obliterate taxiway centerline markings, including runway leadoff lines, leading to the closed section. If the centerline markings will be reused upon reopening the taxiway, it is preferable to paint over the marking. This will result in less damage to the pavement when the upper layer of paint is ultimately removed.

(e) Temporarily Closed Airport. When the airport is closed temporarily, mark all the runways as closed.

(2) If unable to paint temporary markings on the pavement, construct them from any of the following materials: fabric, colored plastic, painted sheets of plywood, or similar materials. They must be properly configured and appropriately secured to prevent movement by prop wash, jet blast, or other wind currents.

(3) It may be necessary to remove or cover runway markings, including but not limited to, runway designation markings, threshold markings, centerline markings, edge stripes, touchdown zone markings and aiming point markings, depending on the length of construction and type of activity at the airport. When removing runway markings, apply the same treatment to areas between stripes or numbers, as the cleaned area will appear to pilots as a marking in the shape of the treated area.

(4) If it is not possible to install threshold bars, chevrons, and arrows on the pavement, temporary outboard markings may be used. Locate them outside of the runway pavement surface on both sides of the runway. The dimension along the runway direction must be the same as if installed on the pavement. The lateral dimension must be at least one-half that of on-pavement markings. If the markings are not discernible on grass or snow, apply a black background with appropriate material over the ground to ensure they are clearly visible.

(5) The application rate of paint to mark a short-term temporary runway and taxiway markings may deviate from the standard (see Item P-620, "Runway and Taxiway Painting," in AC 150/5370-10), but the dimensions must meet the existing standards.

c. Lighting and Visual NAVAIDs. This paragraph refers to standard runway and taxiway lighting systems. See below for hazard lighting. Lighting must be in conformance with AC 150/5340-30, Design and Installation Details for Airport Visual Aids, and AC 150/5345-50, Specification for Portable Runway and Taxiway Lights. When disconnecting runway and taxiway lighting fixtures, disconnect the associated isolation transformers. Alternately, cover the light fixture in such a way as to prevent light leakage. Avoid removing the lamp from energized fixtures because an excessive number of isolation transformers with open secondaries may damage the regulators and/or increase the current above its normal value. Secure, identify, and place any above ground temporary wiring in conduit to prevent electrocution and fire ignition sources.

(1) Permanently Closed Runways and Taxiways. For runways and taxiways that have been permanently closed, disconnect the lighting circuits.

(2) Temporarily Closed Runways. If available, use a lighted X, both at night and during the day, placed at each end of the runway facing the approach. The use of a lighted X is required if night work requires runway lighting to be on. See AC 150/5345-55, Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure. For runways that have been temporarily closed, but for an extended period, and for those with pilot controlled lighting, disconnect the lighting circuits or secure switches to prevent inadvertent activation. For runways that will be opened periodically, coordinate procedures with the FAA air traffic manager or, at airports without an ATCT, the airport operator. Activate stop bars if available. Figure 2-3 shows a lighted X by day. Figure 2-4 shows a lighted X at night.

Figure 2-3 Lighted X in Daytime

Figure 2-4 Lighted X at Night

(3) Partially Closed Runways and Displaced Thresholds. When a runway is partially closed, a portion of the pavement is unavailable for any aircraft operation, meaning taxiing and landing or

taking off in either direction. A displaced threshold, by contrast, is put in place to ensure obstacle clearance by landing aircraft. The pavement prior to the displaced threshold is available for takeoff in the direction of the displacement, and for landing and takeoff in the opposite direction. Misunderstanding this difference and issuance of a subsequently inaccurate NOTAM can result in a hazardous situation. For both partially closed runways and displaced thresholds, approach lighting systems at the affected end must be placed out of service

(a) Partially Closed Runways. Disconnect edge and threshold lights on that part of the runway at and behind the threshold (that is, the portion of the runway that is closed). Alternately, cover the light fixture in such a way as to prevent light leakage.

(b) Displaced Thresholds. Edge lighting in the area of the displacement emits red light in the direction of approach and yellow light in the opposite direction. Centerline lights are blanked out in the direction of approach if the displacement is 700 ft or less. If the displacement is over 700 ft, place the centerline lights out of service. See AC 150/5340-30 for details on lighting displaced thresholds.

(c) Temporary runway thresholds and runway ends must be lighted if the runway is lighted and it is the intended threshold for night landings or instrument meteorological conditions.

(d) A temporary threshold on an unlighted runway may be marked by retroreflective, elevated markers in addition to markings noted in paragraph 218.b(1)(c) above. Markers seen by aircraft on approach are green. Markers at the rollout end of the runway are red. At certificated airports, temporary elevated threshold markers must be mounted with a frangible fitting (see 14 CFR Part 139.309). At non-certificated airports, the temporary elevated threshold markings may either be mounted with a frangible fitting or be flexible. See AC 150/5345-39, Specification for L-853, Runway and Taxiway Retroreflective Markers.

(e) Temporary threshold lights and end lights and related visual NAVAIDs are installed outboard of the edges of the full-strength pavement only when they cannot be installed on the pavement. They are installed with bases at grade level or as low as possible, but not more than 3 in (7.6 cm) above ground. When any portion of a base is above grade, place properly compacted fill around the base to minimize the rate of gradient change so aircraft can, in an emergency, cross at normal landing or takeoff speeds without incurring significant damage. See AC 150/5370-10.

(f) Maintain threshold and edge lighting color and spacing standards as described in AC 150/5340-30. Battery powered, solar, or portable lights that meet the criteria in AC 150/5345-50 may be used. These systems are intended primarily for visual flight rules (VFR) aircraft operations but may be used for instrument flight rules (IFR) aircraft operations, upon individual approval from the Flight Standards Division of the applicable FAA Regional Office.

(g) Reconfigure yellow lenses (caution zone), as necessary. If the runway has centerline lights, reconfigure the red lenses, as necessary, or place the centerline lights out of service.

(h) Relocate the visual glide slope indicator (VGSI), such as VASI and PAPI; other airport lights, such as Runway End Identifier Lights (REIL); and approach lights to identify the temporary threshold. Another option is to disable the VGSI or any equipment that would give misleading indications to pilots as to the new threshold location. Installation of temporary visual aids may be necessary to provide adequate guidance to pilots on approach to the affected runway. If the FAA owns and operates the VGSI, coordinate its installation or disabling with the local ATO/Technical Operations Office. Relocation of such visual aids will depend on the duration of the project and the benefits gained from the relocation, as this can result in great expense.

(i) Issue a NOTAM to inform pilots of temporary lighting conditions.

(4) Temporarily Closed Taxiways. If possible, deactivate the taxiway lighting circuits. When deactivation is not possible (for example other taxiways on the same circuit are to remain open),

cover the light fixture in such a way as to prevent light leakage.

d. Signs. To the extent possible, signs must be in conformance with AC 150/5345-44, Specification for Runway and Taxiway Signs and AC 150/5340-18, Standard for Airport Sign Systems. Any time a sign does not serve its normal function; it must be covered or removed to prevent misdirecting pilots. Note that information signs identifying a crossing taxiway continue to perform their normal function even if the crossing taxiway is closed. For long term construction projects, consider relocating signs, especially runway distance remaining signs.

219. Marking and Signs for Access Routes. The CSPP should indicate that pavement markings and signs for construction personnel will conform to AC 150/5340-18 and, to the extent practicable, with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or State highway specifications. Signs adjacent to areas used by aircraft must comply with the frangibility requirements of AC 150/5220-23, Frangible Connections, which may require modification to size and height guidance in the MUTCD.

220. Hazard Marking, Lighting and Signing.

a. Hazard Marking and Lighting Prevents Pilots from entering areas closed to aircraft, and prevents construction personnel from entering areas open to aircraft. The CSPP must specify prominent, comprehensible warning indicators for any area affected by construction that is normally accessible to aircraft, personnel, or vehicles. Hazard marking and lighting must also be specified to identify open manholes, small areas under repair, stockpiled material, waste areas, and areas subject to jet blast. Also consider less obvious construction-related hazards and include markings to identify FAA, airport, and National Weather Service facilities cables and power lines; instrument landing system (ILS) critical areas; airport surfaces, such as RSA, OFA, and OFZ; and other sensitive areas to make it easier for contractor personnel to avoid these areas.

b. Equipment.

(1) Barricades, including traffic cones, (weighted or sturdily attached to the surface) are acceptable methods used to identify and define the limits of construction and hazardous areas on airports. Careful consideration must be given to selecting equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash and jet blast. The spacing of barricades must be such that a breach is physically prevented barring a deliberate act. For example, if barricades are intended to exclude vehicles, gaps between barricades must be smaller than the width of the excluded vehicles, generally 4 ft. Provision must be made for ARFF access if necessary. If barricades are intended to exclude pedestrians, they must be continuously linked. Continuous linking may be accomplished through the use of ropes, securely attached to prevent FOD.

(2) Lights must be red, either steady burning or flashing, and must meet the luminance requirements of the State Highway Department. Batteries powering lights will last longer if lights flash. Lights must be mounted on barricades and spaced at no more than 10 ft. Lights must be operated between sunset and sunrise and during periods of low visibility whenever the airport is open for operations. They may be operated by photocell, but this may require that the contractor turn them on manually during periods of low visibility during daytime hours.

(3) Supplement barricades with signs (for example “No Entry,” “No Vehicles”) as necessary.

(4) Air Operations Area – General. Barricades are not permitted in any active safety area. Within a runway or taxiway object free area, and on aprons, use orange traffic cones, flashing or steady burning red lights as noted above, collapsible barricades marked with diagonal, alternating orange and

white stripes; and/or signs to separate all construction/maintenance areas from the movement area. Barricades may be supplemented with alternating orange and white flags at least 20 by 20 in (50 by 50 cm) square and securely fastened to eliminate FOD. All barricades adjacent to any open runway or taxiway / taxilane safety area, or apron must be as low as possible to the ground, and no more than 18 in high, exclusive of supplementary lights and flags. Barricades must be of low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, or other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, but not to exceed 3 in (7.6 cm) above the ground. Figure 2-5 and Figure 2-6 show sample barricades with proper coloring and flags.

Figure 2-5 Interlocking Barricades

Figure 2-6 Low Profile Barricades

(5) Air Operations Area – Runway/Taxiway Intersections. Use highly reflective barricades with lights to close taxiways leading to closed runways. Evaluate all operating factors when determining how to mark temporary closures that can last from 10 to 15 minutes to a much longer period of time. However, even for closures of relatively short duration, close all taxiway/runway intersections with barricades. The use of traffic cones is appropriate for short duration closures.

(6) Air Operations Area – Other. Beyond runway and taxiway object free areas and

aprons, barricades intended for construction vehicles and personnel may be many different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels.

(7) Maintenance. The construction specifications must include a provision requiring the contractor to have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades. The contractor must file the contact person's information with the airport operator. Lighting should be checked for proper operation at least once per day, preferably at dusk.

221. Protection of Runway and Taxiway Safety Areas. Runway and taxiway safety areas, Obstacle Free zones (OFZ), object free areas (OFA), and approach surfaces are described in AC 150/5300-13. Protection of these areas includes limitations on the location and height of equipment and stockpiled material. An FAA airspace study may be required. Coordinate with the appropriate FAA Airports Regional or District Office if there is any doubt as to requirements or dimensions (See paragraph 213.e above.) as soon as the location and height of materials or equipment are known. The CSPP should include drawings showing all safety areas, object free areas, obstacle free zones and approach departure surfaces affected by construction.

a. Runway Safety Area (RSA). A runway safety area is the defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway (see AC 150/5300-13). Construction activities within the existing RSA are subject to the following conditions:

(1) No construction may occur within the existing RSA while the runway is open for aircraft operations. The RSA dimensions may be temporarily adjusted if the runway is restricted to aircraft operations requiring an RSA that is equal to the RSA width and length beyond the runway ends available during construction. (see AC 150/5300-13). The temporary use of declared distances and/or partial runway closures may provide the necessary RSA under certain circumstances. Coordinate with the appropriate FAA Airports Regional or District Office to have declared distances information published. See AC 150/5300-13 for guidance on the use of declared distances.

(2) The airport operator must coordinate the adjustment of RSA dimensions as permitted above with the appropriate FAA Airports Regional or District Office and the local FAA air traffic manager and issue a NOTAM.

(3) The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations, if required by operational considerations.

(4) Excavations.

(a) Open trenches or excavations are not permitted within the RSA while the runway is open. If possible, backfill trenches before the runway is opened. If the runway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the runway across the trench without damage to the aircraft.

(b) Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(5) Erosion Control. Soil erosion must be controlled to maintain RSA standards, that is, the RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

b. Runway Object Free Area (ROFA). Construction, including excavations, may be permitted in the ROFA. However, equipment must be removed from the ROFA when not in use, and material should not be stockpiled in the ROFA if not necessary. Stockpiling material in the OFA requires submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval.

c. Taxiway Safety Area (TSA). A taxiway safety area is a defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway. (See AC 150/5300-13.) Construction activities within the TSA are subject to the following conditions:

(1) No construction may occur within the TSA while the taxiway is open for aircraft operations. The TSA dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a TSA that is equal to the TSA width available during construction (see AC 150/5300-13, Table 4-1).

(2) The airport operator must coordinate the adjustment of the TSA width as permitted above with the appropriate FAA Airports Regional or District Office and the FAA air traffic manager and issue a NOTAM.

(3) The CSPP and SPCD must provide procedures for ensuring adequate distance for protection from blasting operations.

(4) Excavations.

(a) Open trenches or excavations are not permitted within the TSA while the taxiway is open. If possible, backfill trenches before the taxiway is opened. If the taxiway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the taxiway across the trench without damage to the aircraft.

(b) Construction contractors must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(5) Erosion Control. Soil erosion must be controlled to maintain TSA standards, that is, the TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting snow removal equipment, aircraft rescue and fire fighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft.

d. Taxiway Object Free Area (TOFA). Unlike the Runway Object Free Area, aircraft wings regularly penetrate the taxiway object free area during normal operations. Thus the restrictions are more stringent. Except as provided below, no construction may occur within the taxiway object free area while the taxiway is open for aircraft operations.

(1) The taxiway object free area dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a taxiway object free area that is equal to the taxiway object free area width available.

(2) Offset taxiway pavement markings may be used as a temporary measure to provide the required taxiway object free area. Where offset taxiway pavement markings are provided, centerline lighting or reflectors are required.

(3) Construction activity may be accomplished without adjusting the width of the taxiway object free area, subject to the following restrictions:

(a) Appropriate NOTAMs are issued.

(b) Marking and lighting meeting the provisions of paragraphs 218 and 220 above are implemented.

(c) Five-foot clearance is maintained between equipment and materials and any part of an aircraft (includes wingtip overhang). In these situations, flaggers must be used to direct construction equipment, and wing walkers will be necessary to guide aircraft. Wing walkers should be airline/aviation personnel rather than construction workers. If such clearance can only be maintained if an aircraft does not have full use of the entire taxiway width (with its main landing gear at the edge of the pavement), then it will be necessary to move personnel and equipment for the passage of that aircraft.

e. Obstacle Free Zone (OFZ). In general, personnel, material, and/or equipment may not penetrate the OFZ while the runway is open for aircraft operations. If a penetration to the OFZ is necessary, it may be possible to continue aircraft operations through operational restrictions. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office.

f. Runway Approach/Departure Areas and Clearways. All personnel, materials, and/or equipment must remain clear of the applicable threshold siting surfaces, as defined in Appendix 2, "Threshold Siting Requirements," of AC 150/5300-13. Objects that do not penetrate these surfaces may still be obstructions to air navigation and may affect standard instrument approach procedures. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office.

(1) Construction activity in a runway approach/departure area may result in the need to partially close a runway or displace the existing runway threshold. Partial runway closure, displacement of the runway threshold, as well as closure of the complete runway and other portions of the movement area also require coordination through the airport operator with the appropriate FAA air traffic manager (FSS if non-towered) and ATO/Technical Operations (for affected NAVAIDS) and airport users.

(2) Caution regarding partial runway closures. When filing a NOTAM for a partial runway closure, clearly state to OCC personnel that the portion of pavement located prior to the threshold is not available for landing and departing traffic. In this case, the threshold has been moved for both landing and takeoff purposes (this is different than a displaced threshold). There may be situations where the portion of closed runway is available for taxiing only. If so, the NOTAM must reflect this condition).

(3) Caution regarding displaced thresholds. : Implementation of a displaced threshold affects runway length available for aircraft landing over the displacement. Depending on the reason for the displacement (to provide obstruction clearance or RSA), such a displacement may also require an adjustment in the landing distance available and accelerate-stop distance available in the opposite direction. If project scope includes personnel, equipment, excavation, other work. within the existing RSA of any usable runway end, do not implement a displaced threshold unless arrivals and departures toward the construction activity are prohibited. Instead, implement a partial closure.

222. Other Limitations on Construction. The CSPP must specify any other limitations on construction, including but not limited to:

a. Prohibitions.

(1) No use of tall equipment (cranes, concrete pumps, and so on) unless a 7460-1 determination letter is issued for such equipment.

(2) No use of open flame welding or torches unless fire safety precautions are provided and the airport operator has approved their use.

(3) No use of electrical blasting caps on or within 1,000 ft (300 m) of the airport property.

See AC 150/5370-10.

(4) No use of flare pots within the AOA.

b. Restrictions.

(1) Construction suspension required during specific airport operations.

(2) Areas that cannot be worked on simultaneously.

(3) Day or night construction restrictions.

(4) Seasonal construction restrictions.

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Chapter 3. Guidelines for Writing a CSPP

301. General Requirements. The CSPP is a standalone document written to correspond with the subjects outlined in Chapter 2, Section 1, paragraph 204. The CSPP is organized by numbered sections corresponding to each subject listed in Chapter 2, Section 1, paragraph 204, and described in detail in Chapter 2, Section 2. Each section number and title in the CSPP matches the corresponding subject outlined in Chapter 2, paragraph 204 (for example, 1. Coordination, 2. Phasing, 3. Areas and Operations Affected by the Construction Activity, and so on.). With the exception of the project scope of work outlined in Section 2. Phasing, only subjects specific to operational safety during construction should be addressed.

302. Applicability of Subjects. Each section should, to the extent practical, focus on the specific subject. Where an overlapping requirement spans several sections, the requirement should be explained in detail in the most applicable section. A reference to that section should be included in all other sections where the requirement may apply. For example, the requirement to protect existing underground FAA Instrument Landing System (ILS) cables during trenching operations could be considered FAA ATO coordination (Section 1. Coordination, paragraph 205.c), an area and operation affected by the construction activity (Section 3. Areas and Operations Affected by the Construction Activity, paragraph 207.a(4)), a protection of a NAVAID (Section 4. Protection of Navigational Aids (NAVAIDs),paragraph 208), or a notification to the FAA of construction activities (Section 9. Notification of Construction Activities, paragraph 210.e(3)(b)). However, it is more specifically an underground utility requirement (Section 11. Underground Utilities, paragraph 215). The procedure for protecting underground ILS cables during trenching operations should therefore be described in Section 11: "*The contractor must coordinate with the local FAA System Support Center (SSC) to mark existing ILS cable routes along Runway 17-35. The ILS cables will be located by hand digging whenever the trenching operation moves within 10 feet of the cable markings.*" All other applicable sections should include a reference to Section 11: "*ILS cables shall be identified and protected as described in Section 11*" or "*See Section 11 for ILS cable identification and protection requirements.*" Thus, the CSPP should be considered as a whole, with no need to duplicate responses to related issues.

303. Graphical Representations. Construction safety drawings should be included in the CSPP as attachments. When other graphical representations will aid in supporting written statements, the drawings, diagrams, and/or photographs should also be attached to the CSPP. References should be made in the CSPP to each graphical attachment and may be made in multiple sections.

304. Reference Documents. The CSPP must not incorporate a document by reference unless reproduction of the material in that document is prohibited. In that case, either copies of or a source for the referenced document must be provided to the contractor.

305. Restrictions. The CSPP should not be considered as a project design review document. The CSPP should also avoid mention of permanent ("as-built") features such as pavements, markings, signs, and lighting, except when such features are intended to aid in maintaining operational safety during the construction.

306. Coordination. Include in this section a detailed description of conferences and meetings both before and during the project. Include appropriate information from AC 150/5300-9. Discuss coordination procedures and schedules for each required FAA ATO airway facility shutdown and restart and all required flight inspections.

307. Phasing. Include in this section a detailed scope of work description for the project as a whole and each phase of work covered by the CSPP. This includes all locations and durations of the work proposed. Attach drawings to graphically support the written scope of work. Detail in this section the sequenced phases of the proposed construction. Include a reference to paragraph 308 below, as appropriate.

308. Areas and Operations Affected By Construction. Focus in this section on identifying the areas and operations affected by the construction. Describe corresponding mitigation that is not covered in detail elsewhere in the CSPP. Include references to paragraphs below as appropriate. Attach drawings as necessary to graphically describe affected areas and mechanisms proposed. Tables and charts such as the following may be helpful in highlighting issues to be addressed.

Table 3-1 Sample Operations Effects

Project	Runway 15-33 Reconstruction	
Phase	Phase II: Reconstruct Runway 15 End	
Scope of Work	Reconstruct 1,000 ft of north end of Runway 15-33 with Portland Cement Concrete (PCC).	
Operational Requirements	**Normal (Existing)**	**Phase II (Anticipated)**
Runway 15 Average Aircraft Operations	Carrier: 52 /day GA: 26 /day Military: 11 /day	Carrier: 52 / day GA: 20 / day Military: 0 /day
Runway 33 Average Aircraft Operations	Carrier: 40 /day GA: 18 /day Military: 10 /day	Carrier: 20 /day GA: 5 /day Military: 0 /day
Runway 15-33 ARC	C-IV	C-IV
Runway 15 Approach Visibility Minimums	¾ mile	1 mile
Runway 33 Approach Visibility Minimums	¾ mile	1 mile
Runway 15 Declared Distances	TORA: 7,820	TORA: 6,420
	TODA: 7,820	TODA: 6,420
	ASDA: 7,820	ASDA: 6,420
	LDA: 7,820	LDA: 6,420
Runway 33 Declared Distances	TORA: 8,320	TORA: 6,920
	TODA: 8,320	TODA: 6,920
	ASDA: 8,320	ASDA: 6,920
	LDA: 7,820	LDA: 6,420
Runway 15 Approach Procedures	ILS	LOC only
	RNAV	N/A
	VOR	N/A
Runway 33 Approach Procedures	ILS	Visual only
	RNAV	N/A
	VOR	N/A
Runway 15 NAVAIDs	ILS/DME, MALSR, RVR	LOC/DME, PAPI (temp), RVR

Runway 33 NAVAIDs	ILS/DME, MALSF, PAPI, RVR	MALSF, PAPI, RVR
Taxiway G ADG	IV	IV (N/A between T/W H and R/W 15 end)
Taxiway E ADG	IV	IV
ATCT (hours open)	06:00 – 24:00 local	06:00 – 24:00 local
ARFF Index	D	D
Special Conditions	Air National Guard (ANG) military operations	Military operations relocated to alternate ANG Base
	Airline XYZ requires VGSI	Airline XYZ requires VGSI

Complete the following chart for each phase to determine the area that must be protected along the runway edges:

Runway	**Aircraft Approach Category* A, B, C, or D**	**Airplane Design Group* I, II, III, or IV**	**RSA Width in Feet Divided by 2***
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
*See AC 150/5300-13 to complete the chart for a specific runway.			

Complete the following chart for each phase to determine the area that must be protected before the runway threshold:

Runway End Number	**Airplane Design Group* I, II, III, or IV**	**Aircraft Approach Category* A, B, C, or D**	**Minimum Safety Area Prior to the Threshold***	**Minimum Distance to Threshold Based on Required Approach Slope***	
_____	_____	_____	_____ ft	_____ ft	_____: 1
_____	_____	_____	_____ ft	_____ ft	_____: 1
_____	_____	_____	_____ ft	_____ ft	_____: 1
_____	_____	_____	_____ ft	_____ ft	_____: 1
*See AC 150/5300-13 to complete the chart for a specific runway.					

309. Navigation Aid (NAVAID) Protection. List in this section all NAVAID facilities that will be affected by the construction. Identify NAVAID facilities that will be placed out of service at any time prior to or during construction activities. Identify individuals responsible for coordinating each shutdown and when each facility will be out of service. Include a reference to paragraph 306 above for FAA ATO NAVAID shutdown, restart, and flight inspection coordination. Outline in detail procedures to protect each NAVAID facility remaining in service from interference by construction activities. Include a reference to paragraph 314 for the issuance of NOTAMs as required. Include a reference to paragraph 316 for the protection of underground cables and piping serving NAVAIDs. If temporary visual aids are proposed to replace or supplement existing facilities, include a reference to paragraph 319. Attach drawings to graphically indicate the affected NAVAIDS and the corresponding critical areas.

310. Contractor Access. This will necessarily be the most extensive section of the CSPP. Provide

sufficient detail so that a contractor not experienced in working on airports will understand the unique restrictions such work will require. Due to this extent, it should be broken down into subsections as described below:

a. Location of Stockpiled Construction Materials. Describe in this section specific locations for stockpiling material. Note any height restrictions on stockpiles. Include a reference to paragraph 321 for hazard marking and lighting devices used to identify stockpiles. Include a reference to paragraph 311 for provisions to prevent stockpile material from becoming wildlife attractants. Include a reference to paragraph 312 for provisions to prevent stockpile material from becoming FOD. Attach drawings to graphically indicate the stockpile locations.

b. Vehicle and Pedestrian Operations. While there are many items to be addressed in this major subsection of the CSPP, all are concerned with one main issue: keeping people and vehicles from areas of the airport where they don't belong. This includes preventing unauthorized entry to the AOA and preventing the improper movement of pedestrians or vehicles on the airport. In this section, focus on mechanisms to prevent construction vehicles and workers traveling to and from the worksite from unauthorized entry into movement areas. Specify locations of parking for both employee vehicles and construction equipment, and routes for access and haul roads. In most cases, this will best be accomplished by attaching a drawing. Quote from AC 150/5210-5 specific requirements for contractor vehicles rather than referring to the AC as a whole, and include special requirements for identifying Hazardous Material (HAZMAT) vehicles. Quote from, rather than incorporate by reference, AC 150/5210-20 as appropriate to address the airport's rules for ground vehicle operations, including its training program. Discuss the airport's recordkeeping system listing authorized vehicle operators.

c. Two-Way Radio Communications. Include a special section to identify all individuals who are required to maintain communications with Air Traffic (AT) at airports with active towers, or monitor Common Traffic Advisory Frequencies (CTAF) at airports without or with closed ATCT. Include training requirements for all individuals required to communicate with AT. Individuals required to monitor AT frequencies should also be identified. If construction employees are also required to communicate by radio with Airport Operations, this procedure should be described in detail. Usage of vehicle mounted radios and/or portable radios should be addressed. Communication procedures for the event of disabled radio communication (that is, light signals, telephone numbers, others) must be included. All radio frequencies should by identified (Tower, Ground Control, CTAF, UNICOM, ATIS, and so on).

d. Airport Security. Address security as it applies to vehicle and pedestrian operations. Discuss TSA requirements, security badging requirements, perimeter fence integrity, gate security, and other needs. Attach drawings to graphically indicate secured and/or Security Identification Display Areas (SIDA), perimeter fencing, and available access points.

311. Wildlife Management. Discuss in this section wildlife management procedures. Describe the maintenance of existing wildlife mitigation devices, such as perimeter fences, and procedures to limit wildlife attractants. Include procedures to notify Airport Operations of wildlife encounters. Include a reference to paragraph 310 for security (wildlife) fence integrity maintenance as required.

312. Foreign Object Debris (FOD) Management. In this section, discuss methods to control and monitor FOD: worksite housekeeping, ground vehicle tire inspections, runway sweeps, and so on. Include a reference to paragraph 315 for inspection requirements as required.

313. Hazardous Materials (HAZMAT) Management. Describe in this section HAZMAT management procedures: fuel deliveries, spill recovery procedures, Material Safety Data Sheet (MSDS) availability, and other considerations. Any specific airport HAZMAT restrictions should also be

identified. Include a reference to paragraph 310 for HAZMAT vehicle identification requirements. Quote from, rather than incorporate by reference, AC 150/5320-15.

314. Notification of Construction Activities. List in this section the names and telephone numbers of points of contact for all parties affected by the construction project. We recommend a single list that includes all telephone numbers required under this section. Include emergency notification procedures for all representatives of all parties potentially impacted by the construction. Identify individual representatives – and at least one alternate – for each party. List both on-duty and off-duty contact information for each individual, including individuals responsible for emergency maintenance of airport construction hazard lighting and barricades. Describe procedures to coordinate immediate response to events that might adversely affect the operational safety of the airport (such as interrupted NAVAID service). Explain requirements for and the procedures for the issuance of Notices to Airmen (NOTAMs), notification to FAA required by 14 CFR Part 77 and Part 157 and in the event of affected NAVAIDs. For NOTAMs, identify an individual, and at least one alternate, responsible for issuing and cancelling each specific type of Notice to Airmen (NOTAM) required. Detail notification methods for police, fire fighting, and medical emergencies. This may include 911, but should also include direct phone numbers of local police departments and nearby hospitals. The local Poison Control number should be listed. Procedures regarding notification of Airport Operations and/or the ARFF Department of such emergencies should be identified, as applicable. If airport radio communications are identified as a means of emergency notification, include a reference to paragraph 310. Differentiate between emergency and nonemergency notification of ARFF personnel, the latter including activities that affect ARFF water supplies and access roads. Identify the primary ARFF contact person and at least one alternate. If notification is to be made through Airport Operations, then detail this procedure. Include a method of confirmation from the ARFF department.

315. Inspection Requirements. Describe in this section inspection requirements to ensure airfield safety compliance. Include a requirement for routine inspections by the resident engineer (RE) and the construction contractors. If the engineering consultants and/or contractors have a Safety Officer who will conduct such inspections, identify this individual. Describe procedures for special inspections, such as those required to reopen areas for aircraft operations. Part 139 requires daily airfield inspections at certificated airports, but these may need to be more frequent when construction is in progress. Discuss the role of such inspections on areas under construction. Include a requirement to immediately remedy any deficiencies, whether caused by negligence, oversight, or project scope change.

316. Underground Utilities. Explain how existing underground utilities will be located and protected. Identify each utility owner and include contact information for each company/agency in the master list. Address emergency response procedures for damaged or disrupted utilities. Include a reference to paragraph 314 above for notification of utility owners of accidental utility disruption as required.

317. Penalties. Describe in this section specific penalties imposed for noncompliance with airport rules and regulations, including the CSPP: SIDA violations, Vehicle/Pedestrian Deviations (VPD), and others.

318. Special Conditions. Identify any special conditions that may trigger specific safety mitigation actions outlined in this CSPP: low visibility operations, snow removal, aircraft in distress, aircraft accident, security breach, VPD, and other activities requiring construction suspension/resumption. Include a reference to paragraph 310 above for compliance with airport safety and security measures and for radio communications as required. Include a reference to paragraph 319 below for emergency notification of all involved parties, including police/security, ARFF, and medical services.

319. Runway and Taxiway Visual Aids. Include marking, lighting, signs, and visual NAVAIDS.

Detail temporary runway and taxiway marking, lighting, signs, and visual NAVAIDs required for the construction. Discuss existing marking, lighting, signs, and visual NAVAIDs that are temporarily, altered, obliterated, or shut down. Consider non-federal facilities and address requirements for reimbursable agreements necessary for alteration of FAA facilities and for necessary flight checks. Identify temporary TORA signs or runway distance remaining signs if appropriate. Identify required temporary visual NAVAIDs such as REIL or PAPI. Quote from, rather than incorporate by reference, AC 150/5340-1, Standards for Airport Markings, AC 150/5340-18, Standards for Airport Sign Systems, and AC 150/5340-30, as required. Attach drawings to graphically indicate proposed marking, lighting, signs, and visual NAVAIDs.

320. Marking and Signs for Access Routes. Detail plans for marking and signs for vehicle access routes. To the extent possible, signs should be in conformance with the Federal Highway Administration Manual on Uniform Traffic Control Devices (MUTCD) and/or State highway specifications, not hand lettered. Detail any modifications to the guidance in the MUTCD necessary to meet frangibility/height requirements.

321. Hazard Marking and Lighting. Specify all marking and lighting equipment, including when and where each type of device is to be used. Specify maximum gaps between barricades and the maximum spacing of hazard lighting. Identify one individual and at least one alternate responsible for maintenance of hazard marking and lighting equipment in the master telephone list. Include a reference to paragraph 314 above. Attach drawings to graphically indicate the placement of hazard marking and lighting equipment.

322. Protection of Runway and Taxiway Safety Areas. This section should focus exclusively on procedures for protecting all safety areas, including those altered by the construction: methods of demarcation, limit of access, movement within safety areas, stockpiling and trenching restrictions, and so on. Reference AC 150/5300-13: Airport Design as required. Include a reference to paragraph 310 above for procedures regarding vehicle and personnel movement within safety areas. Include a reference to paragraph 310 above for material stockpile restrictions as required. Detail requirements for trenching, excavations, and backfill. Include a reference to paragraph 321 for hazard marking and lighting devices used to identify open excavations as required. If runway and taxiway closures are proposed to protect safety areas, or if temporary displaced thresholds and/or revised declared distances are used to provide adequate Runway Safety Area, include a reference to paragraphs 314 and 319 above. Detail procedures for protecting the runway OFZ, runway OFA, taxiway OFA and runway approach surfaces including those altered by the construction: methods of demarcation, limit of cranes, storage of equipment, and so on. Quote from, rather than incorporate by reference, AC 150/5300-13: Airport Design as required. Include a reference to paragraph 323 for height (i.e. crane) restrictions as required. One way to address the height of equipment that will move during the project is to establish a three-dimensional “box” within which equipment will be confined that can be studied as a single object. Attach drawings to graphically indicate the safety area, OFZ, and OFA boundaries.

323. Other Limitations on Construction. This section should describe what limitations must be applied to each area of work and when each limitation will be applied: limitations due to airport operations, height (i.e. crane) restrictions, areas which cannot be worked at simultaneously, day/night work restrictions, winter construction, and other limitations. Include a reference to paragraph 307 above for project phasing requirements based on construction limitations as required.

Appendix 1. Related Reading Material

Obtain the latest version of the following free publications from the FAA on its Web site at http://www.faa.gov/airports/.

AC	Title and Description
AC 150/5200-28	Notices to Airmen (NOTAMs) for Airport Operators
	Guidance for using the NOTAM System in airport reporting.
AC 150/5200-30	Airport Winter Safety and Operations
	Guidance for airport owners/operators on the development of an acceptable airport snow and ice control program and on appropriate field condition reporting procedures.
AC 150/5200-33	Hazardous Wildlife Attractants On or Near Airports
	Guidance on locating certain land uses that might attract hazardous wildlife to public-use airports.
AC 150/5210-5	Painting, Marking, and Lighting of Vehicles Used on an Airport.
	Guidance, specifications, and standards for painting, marking, and lighting vehicles operating in the airport air operations areas.
AC 150/5210-20	Ground Vehicle Operations on Airports
	Guidance to airport operators on developing ground vehicle operation training programs.
AC 150/5300-13	Airport Design
	FAA standards and recommendations for airport design, establishes approach visibility minimums as an airport design parameter, and contains the Object Free area and the obstacle free-zone criteria.
AC 150/5310-24	Airport Foreign Object Debris Management
	Guidance for developing and managing an airport foreign object debris (FOD) program
AC 150/5220-4	Water Supply Systems for Aircraft Fire and Rescue Protection.
	Guidance on selecting a water source and meeting standards for a distribution system to support aircraft rescue and fire fighting service operations on airports.
AC 150/5320-15	Management of Airport Industrial Waste
	Basic information on the characteristics, management, and regulations of industrial wastes generated at airports. Guidance for developing a Storm Water Pollution Prevention Plan (SWPPP) that applies best management practices to eliminate, prevent, or reduce pollutants in storm water runoff with particular airport industrial activities.
AC 150/5340-1	Standards for Airport Markings
	FAA standards for markings used on airport runways, taxiways, and aprons.
AC 150/5340-18	Standards for Airport Sign Systems
	FAA standards for the siting and installation of signs on airport runways and taxiways.
AC 150/5345-28	Precision Approach Path Indicator (PAPI) Systems
	FAA standards for PAPI systems, which provide pilots with visual glide slope guidance during approach for landing.

AC	Title and Description
AC 150/5340-30	Design and Installation Details for Airport Visual Aids
	Guidance and recommendations on the installation of airport visual aids.
AC 150/5345-39	Specification for L-853, Runway and Taxiway Retroreflective Markers
AC 150/5345-44	Specification for Runway and Taxiway Signs
	FAA specifications for unlighted and lighted signs for taxiways and runways.
AC 150/5345-53	Airport Lighting Certification Program
	Details on the Airport Lighting Equipment Certification Program (ALECP).
AC 150/5345-50	Specification for Portable Runway and Taxiway Lights
	FAA standards for portable runway and taxiway lights and runway end identifier lights for temporary use to permit continued aircraft operations while all or part of a runway lighting system is inoperative.
AC 150/5345-55	Specification for L-893, Lighted Visual Aid to Indicate Temporary Runway Closure
AC 150/5370-10	Standards for Specifying Construction of Airports
	Standards for construction of airports, including earthwork, drainage, paving, turfing, lighting, and incidental construction.
FAA Order 5200.11	FAA Airports (ARP) Safety Management System (SMS)
	Basics for implementing SMS within ARP. Includes roles and responsibilities of ARP management and staff as well as other FAA lines of business that contribute to the ARP SMS.
FAA Certalert 98-05	Grasses Attractive to Hazardous Wildlife
	Guidance on grass management and seed selection.
FAA Form 7460-1	Notice of Proposed Construction or Alteration
FAA Form 7480-1	Notice of Landing Area Proposal

Obtain the latest version of the following free publications from the Electronic Code of Federal Regulations at http://ecfr.gpoaccess.gov/.

Title 14 CFR Part 139	Certification of Airports
Title 49 CFR Part 1542	Airport Security

Obtain the latest version of the Manual on Uniform Traffic Control Devices from the Federal Highway Administration at http://mutcd.fhwa.dot.gov/.

Appendix 2. Definition of Terms

Term	Definition
7460-1	Notice Of Proposed Construction Or Alteration. For on-airport projects, the form submitted to the FAA regional or airports division office as formal written notification of any kind of construction or alteration of objects that affect navigable airspace, as defined in 14 CFR Part 77, safe, efficient use, and preservation of the navigable airspace. (See guidance available on the FAA web site at oeaaa.faa.gov.) The form may be downloaded at http://www.faa.gov/airports/resources/forms/, or filed electronically at: https://oeaaa.faa.gov.
7480-1	Notice Of Landing Area Proposal. Form submitted to the FAA Airports Regional Division Office or Airports District Office as formal written notification whenever a project without an airport layout plan on file with the FAA involves the construction of a new airport; the construction, realigning, altering, activating, or abandoning of a runway, landing strip, or associated taxiway; or the deactivation or abandoning of an entire airport The form may be downloaded at http://www.faa.gov/airports/resources/forms/.
AC	Advisory Circular
ACRC	Aircraft Reference Code
ACSI	Airport Certification Safety Inspector
ADG	Airplane Design Group
AIP	Airport Improvement Program
ALECP	Airport Lighting Equipment Certification Program
ANG	Air National Guard
AOA	Air Operations Area. Any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operations area includes such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runways, taxiways, or aprons.
ARFF	Aircraft Rescue and Fire Fighting
ARP	FAA Office of Airports
ASDA	Accelerate-Stop Distance Available
ATCT	Airport Traffic Control Tower
ATIS	Automatic Terminal Information Service
ATO	Air Traffic Organization
Certificated Airport	An airport that has been issued an Airport Operating Certificate by the FAA under the authority of 14 CFR Part 139, Certification of Airports.
CFR	Code of Federal Regulations
Construction	The presence and movement of construction-related personnel, equipment, and materials in any location that could infringe upon the movement of aircraft.
CSPP	Construction Safety And Phasing Plan. The overall plan for safety and phasing of a construction project developed by the airport operator, or developed by the airport operator's consultant and approved by the airport operator. It is included in the invitation for bids and becomes part of the project specifications.

Term	Definition
CTAF	Common Traffic Advisory Frequency
Displaced Threshold	A threshold that is located at a point on the runway other than the designated beginning of the runway. The portion of pavement behind a displaced threshold is available for takeoffs in either direction or landing from the opposite direction.
DOT	Department of Transportation
EPA	Environmental Protection Agency
FOD	Foreign Object Debris
HAZMAT	Hazardous Materials
IFR	Instrument Flight Rules
ILS	Instrument Landing System
LDA	Landing Distance Available
LOC	Localizer antenna array
Movement Area	The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, air taxiing, takeoff, and landing of aircraft, exclusive of loading aprons and aircraft parking areas (reference 14 CFR Part 139).
MSDS	Material Safety Data Sheet
MUTCD	Manual on Uniform Traffic Control Devices
NAVAID	Navigation Aid
NAVAID Critical Area	An area of defined shape and size associated with a NAVAID that must remain clear and graded to avoid interference with the electronic signal.
Non-Movement Area	The area inside the airport security fence exclusive of the Movement Area. It is important to note that the non-movement area includes pavement traversed by aircraft.
NOTAM	Notices to Airmen
Obstruction	Any object/obstacle exceeding the obstruction standards specified by 14 CFR Part 77, subpart C.
OE / AAA	Obstruction Evaluation / Airport Airspace Analysis
OFA	Object Free Area. An area on the ground centered on the runway, taxiway, or taxi lane centerline provided to enhance safety of aircraft operations by having the area free of objects except for those objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. (See AC 150/5300-13, for additional guidance on OFA standards and wingtip clearance criteria.)
OFZ	Obstacle Free Zone. The airspace below 150 ft (45 m) above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway and for missed approaches. The OFZ is subdivided as follows: Runway OFZ, Inner Approach OFZ, Inner Transitional OFZ, and Precision OFZ. Refer to AC 150/5300-13 for guidance on OFZ.
OSHA	Occupational Safety and Health Administration
P&R	Planning and Requirements Group

Term	Definition
PAPI	Precision Approach Path Indicators
PFC	Passenger Facility Charge
PLASI	Pulse Light Approach Slope Indicators
Project Proposal Summary	A clear and concise description of the proposed project or change that is the object of Safety Risk Management.
RE	Resident Engineer
REIL	Runway End Identifier Lights
RNAV	Area Navigation
ROFA	Runway Object Free Area
RSA	Runway Safety Area. A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway, in accordance with AC 150/5300-13.
SIDA	Security Identification Display Area
SMS	Safety Management System
SPCD	Safety Plan Compliance Document. Details developed and submitted by a contractor to the airport operator for approval providing details on how the performance of a construction project will comply with the CSPP.
SRM	Safety Risk Management
Taxiway Safety Area	A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway, in accordance with AC 150/5300-13.
TDG	Taxiway Design Group
Temporary	Any condition that is not intended to be permanent.
Temporary Runway End	The beginning of that portion of the runway available for landing and taking off in one direction, and for landing in the other direction. Note the difference from a displaced threshold.
Threshold	The beginning of that portion of the runway available for landing. In some instances, the landing threshold may be displaced.
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available. The length of the runway less any length of runway unavailable and/or unsuitable for takeoff run computations. See AC 150/5300-13 for guidance on declared distances.
TSA	Taxiway Safety Area Transportation Security Administration
UNICOM	A radio communications system of a type used at small airports.
VASI	Visual Approach Slope Indicators

Term	Definition
VGSI	Visual Glide Slope Indicator. A device that provides a visual glide slope indicator to landing pilots. These systems include precision approach path indicators (PAPI), visual approach slope indicators (VASI), and pulse light approach slope indicators (PLASI).
VFR	Visual Flight Rules
VOR	VHF Omnidirectional Radio Range
VPD	Vehicle / Pedestrian Deviation

Appendix 3. Safety and Phasing Plan Checklist

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

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

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

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

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

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

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

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

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

Appendix 4. Construction Project Daily Safety Inspection Checklist

The situations identified below are potentially hazardous conditions that may occur during airport construction projects. Safety area encroachments, unauthorized and improper ground vehicle operations, and unmarked or uncovered holes and trenches near aircraft operating surfaces pose the most prevalent threats to airport operational safety during airport construction projects. The list below is one tool that the airport operator or contractor may use to aid in identifying and correcting potentially hazardous conditions. It should be customized as appropriate for each project.

Potentially Hazardous Conditions

Item	Action Required	or	None
Excavation adjacent to runways, taxiways, and aprons improperly backfilled.			☐
Mounds of earth, construction materials, temporary structures, and other obstacles near any open runway, taxiway, or taxi lane; in the related Object Free area and aircraft approach or departure areas/zones; or obstructing any sign or marking.			☐
Runway resurfacing projects resulting in lips exceeding 3 in (7.6 cm) from pavement edges and ends.			☐
Heavy equipment (stationary or mobile) operating or idle near AOA, in runway approaches and departures areas, or in OFZ.			☐
Equipment or material near NAVAIDs that may degrade or impair radiated signals and/or the monitoring of navigation and visual aids. Unauthorized or improper vehicle operations in localizer or glide slope critical areas, resulting in electronic interference and/or facility shutdown.			☐
Tall and especially relatively low visibility units (that is, equipment with slim profiles) — cranes, drills, and similar objects — located in critical areas, such as OFZ and approach zones.			☐
Improperly positioned or malfunctioning lights or unlighted airport hazards, such as holes or excavations, on any apron, open taxiway, or open taxi lane or in a related safety, approach, or departure area.			☐
Obstacles, loose pavement, trash, and other debris on or near AOA. Construction debris (gravel, sand, mud, paving materials) on airport pavements may result in aircraft propeller, turbine engine, or tire damage. Also, loose materials may blow about, potentially causing personal injury or equipment damage.			☐

Item	Action Required	or	None
Inappropriate or poorly maintained fencing during construction intended to deter human and animal intrusions into the AOA. Fencing and other markings that are inadequate to separate construction areas from open AOA create aviation hazards.			☐
Improper or inadequate marking or lighting of runways (especially thresholds that have been displaced or runways that have been closed) and taxiways that could cause pilot confusion and provide a potential for a runway incursion. Inadequate or improper methods of marking, barricading, and lighting of temporarily closed portions of AOA create aviation hazards.			☐
Wildlife attractants — such as trash (food scraps not collected from construction personnel activity), grass seeds, tall grass, or standing water — on or near airports.			☐
Obliterated or faded temporary markings on active operational areas.			☐
Misleading or malfunctioning obstruction lights. Unlighted or unmarked obstructions in the approach to any open runway pose aviation hazards.			☐
Failure to issue, update, or cancel NOTAMs about airport or runway closures or other construction related airport conditions.			☐
Failure to mark and identify utilities or power cables. Damage to utilities and power cables during construction activity can result in the loss of runway / taxiway lighting; loss of navigation, visual, or approach aids; disruption of weather reporting services; and/or loss of communications.			☐
Restrictions on ARFF access from fire stations to the runway / taxiway system or airport buildings.			☐
Lack of radio communications with construction vehicles in airport movement areas.			☐
Objects, regardless of whether they are marked or flagged, or activities anywhere on or near an airport that could be distracting, confusing, or alarming to pilots during aircraft operations.			☐
Water, snow, dirt, debris, or other contaminants that temporarily obscure or derogate the visibility of runway/taxiway marking, lighting, and pavement edges. Any condition or factor that obscures or diminishes the visibility of areas under construction.			☐
Spillage from vehicles (gasoline, diesel fuel, oil) on active pavement areas, such as runways, taxiways, aprons, and airport roadways.			☐

Item	Action Required	or	None
Failure to maintain drainage system integrity during construction (for example, no temporary drainage provided when working on a drainage system).			☐
Failure to provide for proper electrical lockout and tagging procedures. At larger airports with multiple maintenance shifts/workers, construction contractors should make provisions for coordinating work on circuits.			☐
Failure to control dust. Consider limiting the amount of area from which the contractor is allowed to strip turf.			☐
Exposed wiring that creates an electrocution or fire ignition hazard. Identify and secure wiring, and place it in conduit or bury it.			☐
Site burning, which can cause possible obscuration.			☐
Construction work taking place outside of designated work areas and out of phase.			☐

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CONSTRUCTION SAFETY AND PHASING REPORT

RUNWAY 12R-30L REHABILITATION AND
TERMINAL AREA TAXIWAY IMPROVEMENTS
(PACKAGE 1)

AT

SAN ANTONIO INTERNATIONAL AIRPORT
PROJECT NO. 33-00178 AND 33-00193
AIP NO. 3-48-0192-XX-2013

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JULY 2013

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PLANS

A. COORDINATION

Preliminary Requirements

This project consists of construction work at San Antonio International Airport, San Antonio, Texas. The purpose of this project is to repair existing pavements in need and to construct new pavements consistent with the future plans of the airport. The pavement areas were identified during a recent pavement management program as being in need of repair. The intent of this contract is to provide for construction and completion, in every detail, of the work described. It is further intended that the Contractor furnish all labor, materials, equipment, tools, transportation and supplies required to complete the work in accordance with the plans, specifications, and terms of the contract.

The Contractor is broken out into a base bid and five (5) alternatives. A description of this and how they are broken out are as follows;

BASE BID

The "Base Bid" consists of the reconstruction of two areas of pavement on Runway 12R-30L. The area of reconstruction on the 12R end of the runway is 325 feet long and 150 feet wide while the area on the 30L end is 425 feet long by 50 feet wide. Both of these locations will require the removal of the existing Portland Cement Concrete (PCC) pavement section including the removal of the Cement Treated Base (CTB). The existing sub-base will be re-compacted and 16 inches of reinforced PCC pavement will be constructed on 12 inches of CTB. In addition to the runway, Taxiway W will be constructed to a point outside of the Runway Safety Area (RSA). This taxiway will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade.

ALTERNATE BID NO. 1

Alternate bid number one (1) consists of the reconstruction and expansion of the inner taxilane and stub outs for ultimate connecting taxiways to Taxiway G. The inner taxilane will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade.

ALTERNATE BID NO. 2

Alternate bid number two (2) consists of the reconstruction and expansion of a portion of Taxiway G and the construction of a new connecting taxiway (G2) to the inner taxilane. This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade.

ALTERNATE BID NO. 3

Alternate bid number three (3) consists of the reconstruction and expansion of a portion of Taxiway G and the construction of a new connecting taxiway (G1) to the inner taxilane. This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade.

ALTERNATE BID NO. 4

Alternate bid number four (4) consists of the reconstruction and expansion of a portion of Taxiway G and the construction of a new connecting taxiway (G3) to the inner taxilane. This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade.

ALTERNATE BID NO. 5

Alternate bid number five (5) consists of the construction of the remaining portion of Taxiway W from the RSA to Taxiway G including the FAA required tapers. Alternate 5 also includes the reconstruction of a portion of Taxiway G, the installation of asphalt paved shoulders along Taxiway G and the construction of a painted island (Taxiway W Island). This pavement will be constructed with 16 inches of PCC pavement on 12 inches of CTB on 6 inches of Crushed Aggregate Base (AB) on 6 inches of lime stabilized subgrade on compacted subgrade.

Each alternative will additional work that includes airport safety and security, storm water pollution prevention, all construction surveying and layout, existing utility location, contractor quality control, pavement saw cutting, pavement removal, excavation and grading, Portland cement concrete, cement treated base, crushed aggregate base course, lime stabilized base, asphalt surface course shoulder pavement, paint marking & removal, electrical conduit, light, & signage installation both temporary and permanent, drainage pipe and inlet removal and installation, and engineer's field and laboratory office.

This Construction Phasing & Safety Plan provides specific information to the Contractor and/or Subcontractors selected to carry out the construction contract for the Runway 12R-30L Rehabilitation and Terminal Area Taxiway Improvements (Package 1). This plan includes the requirements and procedures for accident prevention, safety requirements, and security considerations at the San Antonio International Airport. 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) 150/5370-2F, Operational Safety on Airports during Construction. This will be discussed at the Pre-Bid and Pre-Construction Conferences.

The Contractor or Subcontractor shall conduct operations in a manner that will provide safe working conditions for all employees, 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 supplier of the obligations assumed by the Contractor under contract with the City of San Antonio 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 area by personnel, vehicles, equipment, and aircraft during construction; and to positively separate construction activity from aircraft operations.

1. PRECONSTRUCTION CONFERENCE
    a) A preconstruction conference will be convened and conducted by the airport and construction administration team prior to the issuance of the Notice to Proceed. Invitees and attendees will include SAT personnel, the Engineer, the Contractor's Project Superintendent, and representatives from the FAA. (in person or by phone), and relevant safety-related issues will be discussed in detail at this meeting.

        At the Pre-Construction Conference, topics of discussion will include the FAA Advisory Circular (AC) 150/5370-2F, Operational Safety on Airports during Construction, project scope, the Resident Engineer's responsibility and authority, 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, quality control, quality acceptance, maintenance of record drawings,

labor requirements; and DBE, MBE, and EEO requirements, environmental factors, and other factors that will pertain to this construction project.

The Pre-Construction Meeting has not yet been scheduled but will tentatively take place in _____, 2013 at the Airport.

The preconstruction conference will be conducted as soon as practicable after the contract has been awarded and held before the notice to proceed is given to the contractor.
The information covered in this meeting will follow the guidelines outlined in AC 150/5300-9, "Predesign, Prebid, and Preconstruction Conferences for Airport Grant Projects."

2. CONTRACTOR PROGRESS MEETINGS

Weekly construction progress meetings will be held at San Antonio International Airport where the invitees and attendees will include at minimum SAT personnel, the Project Engineer, 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 this Safety Plan will be reviewed and discussed.

a) The progress meetings will cover safety and security, airport operations, project schedule, environmental, quality control/quality acceptance, administration and pay applications, submittals and changes.
b) During these meetings, the contractor shall submit to the airport the following safety information if applicable:
    - Number of near misses from the previous period;
    - Number of accidents from the previous periods;
    - Number of recordable injuries from the previous period; and
    - Summarization of any accident that took place from the previous period.

Additional meetings may be scheduled in between the weekly construction meetings as seen necessary by the Project Engineer or SAT personnel.

3. SCOPE OR SCHEDULE CHANGES
   a) Project scope and construction schedule shall be discussed and established at the preconstruction conference.
   b) Any changes to the project scope shall be discussed throughout the duration of the project and during contractor progress meetings.
   c) The contractor shall submit an updated construction schedule and discuss any changes in the schedule during each progress meeting.

4. FAA AIR TRAFFIC ORGANIZATION COORDINATION
   a) Communication with the San Antonio FAA air traffic control tower will be coordinated by the airport's construction administration team and/or the airport airfield operations division.
   b) The FAA air traffic control tower personnel will be invited to attend the preconstruction conference at which time the overall construction schedule will be presented.
   c) A meeting will be scheduled with the FAA air traffic control personnel prior to the start of each major construction phase which significantly impacts/modifies airfield closures throughout the duration of the construction project. Participants in these meetings shall include: airport staff, airport operations, design team, construction administration team, FAA regional office, FAA air traffic control, contractor, and subcontractors.

PHASING

1. The Base Bid and Alternatives associated with this project are described on page 1 and 3 under the "Preliminary Requirements" portion of this report.

2. The Base Bid includes two portions of Runway 12R-30L pavement rehabilitation and the construction of a portion of Taxiway W to a point outside of the Runway Safety Area (RSA). While these areas are under construction, Runway 12R-30L shall not be used for landing and departure activities; however, portions of the runway that are not under construction will be open for aircraft taxi. Lighted runway "X's" will be placed on the Runway Numbers on the west end (12R) and 350 feet from the east end (30L) of the runway and outside of the Runway 4-22 RSA. Two additional runway closure "X"s will also be placed as directed by airport operations just beyond the limits of the construction. A NOTAM will be issued for this runway denoting that the NAVAID facilities for this runway shall be out of service for the duration of this work and as shown on the project plans. Low profile barricades will be provided and adjusted to accommodate the construction on the runway while limiting taxiing aircraft to access the site. Additional

barricades will be provided perpendicular to the Runway centerline to allow aircraft to taxi across Runway 12R-30L in specific locations. Flag men will be located along the runway at these crossings in order to allow contractor access to both ends of the runway safely without interrupting taxiing aircraft.

Interlocking barricades will be placed along the Southern limit of Taxiway W upon completion of this phase in order to stop any aircraft that might turn along this taxiway stub out. These barricades will be provided by the contractor and will remain the property of the airport. The airport will maintain these barricades following the acceptance of the base bid.

Low profile barricades shall be adjusted to accommodate construction on the inner Taxilane, Taxiways G, G1, G2, G3, and the remaining portion of Taxiway W. Taxi routes that will undergo periodic closures throughout the project shall be Taxiway G, Taxiway N, and the inner taxilane located adjacent to the concourse apron as shown on the project plans. This area will be broken into 5 alternatives in order to maximize funding available to this project. Specific phasing plans have been created for each alternative assuming that they are constructed to the limits shown on each phase and in sequential order. However, depending on the amount awarded, these phasing plans will be modified to accommodate more pavement being constructed simultaneously. Interlocking barricades will be placed along the Northern limit of Taxiways G1, G2 and G3 upon completion of this phase in order to stop any aircraft that might turn along this taxiway stub out. These barricades will be provided by the contractor and will remain the property of the airport. The airport will maintain these barricades following the acceptance of the base bid.

3. Existing airfield lighting circuits shall remain in service for all areas open to aircraft during all hours of darkness and during instrument meteorological conditions (below 1,000 feet ceiling or less than 3 miles of visibility) unless prior approval has been obtained from the airport. No direct payment for jumpers shall be made.

4. Construction staging areas, access and haul routes, lighting, and marking shall be as shown on the plans and as described in the paragraphs below.

The Construction Operations and Safety Plan as well as the Construction Phasing plan for each base bid and alternatives can be seen in the C2.X series of the plans and are attached to the back of this report.

B. AREAS OF OPERATION AFFECTED BY THE CONSTRUCTION ACTIVITY

1. Affected areas on the Airfield

   Runway 12R-30L, Taxiway G and the Inner Taxilane will be directly affected by the construction within the limits of these existing areas of pavement. The limits specific to the Base bid and each alternative can be seen on the individual phasing sheets.

2. Closed or Partially closed facilities

   As previously discussed, Runway 12R-30L will be closed except for specific Taxiway crossings as shown in the plans and will remain closed for the duration of the Base Bid. Portions of the inner Taxilane and Taxiway G will be closed for specific alternatives with the limits of this closure based on the award of the alternatives.

   Work will be performed within Alternate Bid construction area as a series of short term temporary closures, as determined by the Airport Operations at the time of construction.

3. ARFF Access Road

   The Contractor will be directed to maintain access for all existing paths that may be used by ARFF vehicle within the Airfield Operations Area at all times during this project.

4. Airport and Airline Support Vehicle Access Routes

   Airport support vehicle access routes will be maintained throughout the project. If the Contractor elects to use the existing Airfield Perimeter or other Service roads, the Contractor will be required to maintain those roads at all times. Furthermore, the Contractor will be directed that Airfield Operations will always have the right-of-way. The proposed Contractor's access routes can be seen on sheet C2.1 *Construction Operations and Safety Plan.*

5. Utilities for Firefighting

   No underground utilities used for firefighting are within the project area and will be impacted as a result of or during the construction of this project. The Contractor will be responsible for performing the necessary potholing for existing utilities to ensure damage is avoided.

There is an existing fire hydrant along Wetmore at Gate number 278 that may be used for construction water, as long as doing so does not impact firefighting operations in any manner. The contractor must coordinate this with the local Utility in order to gain access to the line and have a meter installed.

6. Affected Approach and Departure Surfaces

   The Approach and Departure surfaces for Runway 12R-30L will be affected during the rehabilitation of Runway 12R-30L and will require the full closure of Runway 12R-30L.

   The Approach and Departure surfaces for parallel Runway 4-22 and Runway 12L-30R will not be affected by the Contractor's operations or staging during this project.

7. Affected Instrument Approach Procedures and NAVAID Critical Areas

   Landings will not be permitted on Runway 12R-30L for the phase duration of the base bid, and any NAVAID's associated with this Runway will not be in operation until this phase is complete.

8. Construction Staging Area and Haul Routes

   The Contractor's Staging Area, Stockpile Area, haul routes, and construction access areas are shown on the *Construction Operations and Safety Plan*. The Contractor's Staging Area and Stockpile Area have been located outside of all Object Free Areas and runway imaginary surfaces. Construction access areas and haul routes have been chosen to minimize the impact to airfield operations however, due to the location of the project site; there will be a need for flaggers for vehicular traffic crossing active taxiways. The Contractor is required to supply gate guard's at all temporary construction entrances to the airfield depending on the specific route to be used.

   Any truck drivers/contractors that will be on airport property for 14 days or more throughout the duration of this project will be required to obtain a San Antonio International Airport (SAT) airport security badge, which is known as a Security Identification Display Area (SIDA) badge.

9. Temporary Taxi Operations

   Portions of the inner Taxilane and Taxiway G will be closed at different times throughout this project depending on the alternates awarded with this project. All other taxiways will remain open and operate under normal conditions. The contractor will remain outside of taxiway Object

Free Areas, as required per FAA AC 150/5370-2F, *Operational Safety on Airports During Construction*. Areas of closure are shown for each alternative on the individual *Construction Phasing Plans for each area.*

10. Detours for ARFF and Other Vehicles

Airport support vehicle access routes, including AFFF, will be maintained throughout the project. The Contractor must coordinate construction and construction vehicle movement with SAT Operations during each phase of construction to ensure safety. Contractor vehicle movements to and from the site will follow approved Access and Haul Roads as defined in each specific Phasing plan.

11 Maintenance of Essential Utilities

No impacts to essential utilities are anticipated during this project. The Contractor is responsible for locating and protecting all existing utilities within the project area.

12 Temporary ATCT Procedures

The SAT Air Traffic Control Tower (ATCT) will be kept up-to-date of all construction activities throughout the duration of the project. The ATCT is invited to attend the weekly construction meetings, will be provided construction schedules at least three weeks ahead of the proposed construction activities, and will be expected to provide feedback about any concerns that the ATCT has for construction areas and Contractor movements. Project exhibits and 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.

Each operational and phasing plan consists of the following information:

- Description of each phase
- Areas closed to aircraft operations
- Routes open to aircraft operations
- Access routes for Aircraft Rescue Fire Fighting (ARFF) equipment
- Construction staging areas
- Construction access and haul routes
- Impacts to NAVAIDs
- Lighting and marking changes
- Lead times for required notifications

C. PROTECTION OF NAVIGATIONAL AIDS

1. NAVAID Critical Areas

Landings will not be permitted on Runway 12R-30L for the duration of the Base Bid Phase of the project, and Runway 12R-30L NAVAID's will not be in operation until the phase is complete. Critical Areas will remain clear.

2. Effects of Construction on NAVAID Performance

Runway 12R-30L should be fully operational during all Alternate (1-5) phases of this project.

3. Protection of NAVAID Facilities

No work will take place on or near NAVAID Facilities as part of this project. Contractor shall protect NAVAID Facilities in place. All navigation equipment and NAVAID critical areas to remain active inside the limits of construction during construction shall be delineated with orange safety fence at no additional cost to the project.

The contractor shall protect in-place all navigation equipment within the limits of construction unless otherwise specified in construction documents. Any damage to navigation equipment shall be reported immediately to the airport.

4. Required Distance from NAVAIDs to Construction Areas

The existing PAPI on the south side Runway 12R-30L will be in the vicinity of grading operations. The contractor must fence off and remain at least 15 feet away from this location. However, if grading limits dictate that this to be different, the contractor shall have a member of the observation team present while grading in this area.

Equipment and materials shall not be stored near any navigation equipment.

5. Coordination Procedures with FAA/ATO

SAT staff will be responsible for continually coordinating as required with the FAA/ATO during construction. Prior to commencement of construction, FAA ATO/Technical Operations office will be notified to evaluate the effect of construction activity on the navigational equipment.

D. CONTRACTOR ACCESS

1. CONSTRUCTION SITE ACCESS AND HAUL ROAD

a) Haul roads to be used on this project are indicated on the drawings or otherwise specifically authorized by the designer. The contractor shall confine all vehicles and equipment to the designated construction areas, staging areas and haul routes. If deemed necessary by SAT, the Contractor will be required to mark the haul routes not on pavement with vertical panel barricades with red lights prior to the start of work. The haul route shall be delineated with barricades spaced at 40 feet with additional barricades placed at intersections the entire distance from the project location to the staging area location. Flaggers will be used to regulate construction vehicles as they cross active Taxiways, see *Construction Phasing Plan.* The entire haul route must be marked with steady burn or flashing red omni-directional lights 24/7, for the duration of the project. It is the Contractor's responsibility to monitor the haul route on a daily basis to ensure all delineators are in place and working properly.

b) The contractor is advised that other contractors may be utilizing the same haul road and performing work in the vicinity of this project.

c) The contractor shall keep all construction vehicles and traffic off of the west service road.

d) Access points to the project site are shown on this plan. The specified gate shall be monitored for access control by a contractor supplied SIDA badged personnel during all contractor operations while an access gate to the SIDA is open or unlocked. Per Transportation Security Administration (TSA) pedestrian access into the SIDA on foot through a designated vehicle gate is prohibited. All vehicle access gates must be enter/exit solely by vehicles. Deviation to this rule will result in a SAT/TSA security violation.

e) The contractor shall be responsible for restoring all airport roads to their pre-construction condition where such roads are used by the contractor. The existing condition of all anticipated haul routes shall be documented prior to hauling. See Specification *Division E Item 100 "Mobilization"* for requirements. No direct pay shall be made for this work.

f) The contractor shall restore all turfed and paved area used for haul roads to their original condition, including establishment of new turf. All costs for constructing, removing, and

restoring of haul roads required for the completion of the work shall be borne by the contractor.

g) The contractor shall not permit any unauthorized construction personnel or traffic on the project site. The contractor shall be responsible for traffic control to and from the project site. Contractor provided directional signage at the access gate and along the delivery route to the staging area and project site shall be reviewed by the engineer and airport's security department prior to installation.

h) All contractor material orders for delivery to the site shall be directed to the access point identified or contractor staging area.

i) The contractor, through the airport, shall establish and maintain a list of contractor and sub-contractor vehicles authorized to operate on the project site. Vehicle use permits shall be assigned in accordance with airport security procedures.

j) It shall be the contractor's responsibility to coordinate the use of off-site routes (state highways, county roads or city streets) with the appropriate owner who has jurisdiction over the affected route.

k) All vehicles using haul routes including off-site routes shall be covered to prevent blowing away or spillage of loose material. All spillages on public roadways and site roads shall be promptly cleaned up and legally disposed of at no additional cost to the airport.

l) The contractor will not be permitted to use any access or haul roads other than those designated on the contract drawings. Aircraft Rescue and Fire Fighting (ARFF) has the right-of-way on access roads, haul roads, taxiways, and runways shall not be impeded at any time.

2. 49 CFR Part 1542 Airport Security

The project will require that the Contractor and any employees, subcontractors and delivery staff working inside the SIDA undergo the SIDA badge process, and will be responsible for being vigilant in helping to maintain security of the SIDA. The Contractor will be responsible for posting SIDA badged personnel at Contractor access points in the SIDA and locking each access gate when leaving the project each day.

The airport is operated in strict compliance with Transportation Security Administration (TSA) and Federal Aviation Regulations (FAR), which prohibit unauthorized persons or vehicles in the SIDA. Equipment and workmen will be restricted to the work area defined on the plans. Any violation by Contractor's personnel or sub-contractors will subject the contractor to penalties imposed by the TSA, FAA or SAT.

The Contractor will assume all fines against SAT assessed to them by the FAA/TSA for the Contractor's security violations. Typical 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 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:

a) The Contractor shall be held responsible for controlling his employees, subcontractors, and their employees with regard to traffic movement.

b) 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.

c) 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, installation sequence of underground electrical and storm sewer systems, paving sequence, installation sequence of electrical items, maintenance of airfield electrical and NAVAID power and control circuits. 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.

d) 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 Meeting. No work may commence until this plan is approved. The Plan must include material haul roads.

e) The Contractor shall provide a responsible Traffic Manager whose duty shall be to direct all 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.

Airport Access Badging: All Contractor and /or subcontractor personnel performing work functions in accordance with this contract shall obtain and properly display a San Antonio International Airport (SAT) airport security badge, which is known as a Security Identification Display Area (SIDA) badge.

All contractors and sub-contractor personnel that are to be issued a SIDA badge are required to attend and successfully complete a training class before being issued a SIDA badge. Fees for the SIDA badge include attendance for the necessary training classes. Attendance of the security classes may take a minimum of 2 hours per person.

The types of training required will be determined by the scope and location of the work involved. All personnel that will receive SIDA badges shall attend the security training. Additionally, personnel operating vehicles or equipment within the SIDA must attend Airport Operations driver training and any personnel acting as a Gate Guard/Crossing Guard (Flagger) will receive additional instruction from the airport to perform their duties.

The contractor shall immediately notify Airport Operation Control Center (OCC) at 207-3433 in the event personnel whose employment status has changed and the individual no longer maintain a need a SAT SIDA badge.

Both the individual and the contractor share responsibility to return the SIDA badge to Airport Security Badge & Identification office or to Airport Security when association with the contractor is discontinued. The contractor shall be responsible for retrieving all SIDA badges and return them once there is no longer a valid business need to obtain one. A fee will be charged for each SIDA badge that is damaged, lost, or not returned.

For current badging hours or any other questions pertaining to SIDA badges, you can reach the Airport Security Badge & Identification office at 207-3526.

SIDA badges are issued by SAT Airport Security and will be required to properly display above the waistline on the outer most garment when working within the Security Identification Display Area (SIDA).

- SIDA badges issued by the San Antonio International Airport (SAT) are property of the San Antonio International Airport (SAT) and must be surrendered upon the request of SAT Airport Police or SAT Airport Security.
- The contractor must immediately report to the Airport Operation Control Center (OCC) at 207-3433 or Airport Security Badge & Identification office at 207-3526 any Lost, Stolen, or Not Returned SIDA badge or any employee who quits or is terminated.
- It is the contractors responsibility to return all employees SIDA badges to the San Antonio International Airport (SAT).once there is no longer a business need to maintain them.

3. CONTRACTOR STAGING AREA

a) The limits of construction, contractor's staging area and stockpile areas required for the contractor's exclusive use during construction are shown on the plans. Additional areas may be requested by the contractor and approved by the SAT. The contractor shall provide devices visible for both day and night use to delineate the perimeter of all such areas.

b) Contractor shall install a minimum 3" thick graded and compacted gravel bed to the limits of the contractor staging area that is not asphalt or concrete pavement. The contractor shall protect all existing drainage structures from any damage caused while the area is being used as a construction staging area. All damage shall be repaired to the satisfaction of the Aviation Department and at no additional cost to the Aviation Department. A staging area layout plan shall be submitted to the owner and the engineer for review and approved prior to construction.

c) The contractor shall not park equipment or store materials within ten (10) feet of the SIDA fence line.

d) The contractor shall maintain existing drainage patterns at the staging and stockpile areas and provide temporary routing of stormwater around the areas.

e) In order to prevent sediment from leaving the contractor staging area, the contractor shall install temporary silt fence around the staging area and provide inlet protection devices for all existing drainage structures.

f) All erosion control measures within the contractor staging area shall be incidental to the project and are outlined in the stormwater pollution prevention plan

g) Airfield Operations will be on site for the duration of the project and will attend the weekly and daily meetings with the Contractor. At these daily meetings, the Contractor shall inform the team of the daily construction activities and priorities.

h) Contractor shall provide an engineer's field office in accordance with Section E, Item 101, *"Preparing Right of Way"*. Engineer's field office shall be located where shown on the plans or as approved by the designer.

i) The contractor shall provide temporary utilities to the site in accordance to Section E, Item 100, *"Mobilization"*. All costs associated with temporary utilities shall be incidental the project.

j) All staging areas shall be inspected and approved by the airport's fire department. The contractor shall supply any and all firefighting equipment, protection and safety equipment/supplies as requested by the airport's fire department within 24 hours after requested.

k) Contractor shall supply trash and rubbish dumpsters and all other containers for removal of trash, rubbish, and debris resulting from the work of the contract. The contractor should not allow dumpsters to overflow.

l) The contractor shall completely clean up and restore the entire staging and storage areas, as approved by the designer prior to final completion. All unused materials shall be

removed from the project site at the contractor's expense, unless prior approval has been given from the Aviation Department and the staging area graded smooth, sloped to drain and seeded. No direct payment shall be made.

4. CONTRACTOR EMPLOYEE AND EQUIPMENT PARKING

a) Contractor employee parking will be coordinated with the owner prior to notice to proceed. A preliminary location is shown on the *Construction Operations and Safety Plan*. Personal vehicles will be parked at a designated area. Contractor's employees will be transported to the job site by means of a company vehicle.

b) All on site vehicles and equipment shall be parked in the designated staging area as shown on the plans. If a vehicle is to be serviced it shall be within the staging area and not in the employee parking area. Personal vehicles will not be allowed onto the airfield.

c) All materials and equipment when not in use shall be placed in approved areas where they will not constitute a hazard to aircraft operations and not penetrate clearance height restrictions as shown on the construction plan(s). All equipment shall be parked in the appropriate area(s) when not in use.

5. VEHICLE CONDITION

a) Vehicles and equipment that are deemed a potential hazard by the engineer shall be removed from the job site and airport property at the request of the engineer. Vehicles and equipment that leak any automotive fluid especially oil, hydraulic fluid, transmission fluid, gear oil, gasoline, diesel, etc. Will be removed to the staging area and not allowed to operate on any paved surface. If the vehicle cannot be repaired within a few days the vehicle shall be removed from the airport. Leaking fluids on pavements damage the pavement.

b) The contractor shall cleanup, at contractor's expense, any and all leaks or spills. Leaks on paved surfaces shall be cleaned up immediately. Significant leak spots on pavement, as determined by the engineer, shall be replaced with new pavement. Asphalt will require milling and placement of new bituminous material; PCC will require saw, removal and repair as directed by the engineer. Dirt or gravel areas will require removal, legal disposal and replacement of the area with similar approved materials.

6. LOCATION OF STOCKPILED MATERIALS

All Contractor materials, equipment and supplies shall be staged within the designated staging area. The Contractor shall keep the staging area neat and clean of debris.

For equipment that must remain in the work area, the following criteria must be met:

- Equipment must be located outside of active the runway/taxiway safety and object free areas.
- Equipment must be marked with lighted barricades around the equipment perimeter with a spacing of no more than 10 feet.
- Equipment to be staged must be coordinated at least 48 hours in advance with the Engineer.
- The highest point of the equipment must be marked and lit with a red flashing/steady burning omni-directional obstruction light

Stockpiling of materials is permitted, as long as the following criteria are met:

- Material may be stockpiled within the closed portion of Runway 12R-30L, Taxiway G and the Inner Taxilane during construction.
- The Contractor may also use the Contractor's Staging area to stockpile material.

Construction activity shall be prohibited when equipment penetrates the imaginary surface described in Title 14 CFR Part 77 and any restricted area as defined in AC 150/5300-13, *Airport Design* current edition, unless a favorable airspace finding has been made by the FAA and SAT, and approved by the Operations manager on Duty. Equipment that penetrates the Part 77 imaginary surface must display an orange and white checkered flag during daytime operations and red obstruction light during nighttime use.

There shall not be any stockpiled materials in the active runway or taxiway safety areas or in the infield areas. Stockpiled material or equipment shall not be stored near aircraft turning areas or operational movement areas, aprons, or excavations and trenches. Stockpiled materials shall not be stored near NAVAIDs, visual or approach aids, nor shall they obstruct the ATCT's line of sight to any runway or taxiway. The contractor shall ensure that stockpiled materials do not cause degraded or hazardous conditions to airport operations safety. This includes determining and verifying that stockpiled materials are stored at an approved location, that they are properly

stowed to prevent foreign object debris (FOD), attraction by wildlife, or obstruction of air operations either by their proximity to NAVAIDs or to aircraft movement areas.

All stockpiled material(s)/supplies shall be constrained in a manner to prevent movement resulting from aircraft blast or wind conditions. Material(s)/supplies shall not be stored within 500 feet of aircraft turning areas or movement areas. Stockpiled material(s)/supplies shall not exceed 15 feet in height unless the contractor has complied with all requirements for airspacing and secured approval from SAT airfield operation unit or City of San Antonio Aviation Department planning, design, and construction division. All material(s)/supplies shall be positioned so it will not obstruct the line of sight from the control tower to the movement area. Marking and lighting shall be in accordance with the requirements contained in barricade details checklist.

Stockpiled materials should be stabilized with water in order to reduce dust during windy conditions. The Contractor shall also try to minimize the height of stockpiles when possible. Daily inspections by the Contractor will be required of the stockpiles and other areas within the construction limits that may be affected by windy conditions. Construction Administration personnel will also be performing daily inspections on these areas to insure compliance with this aspect.

7. VEHICLE AND PEDESTRIAN OPERATIONS

   a) Vehicle and access routes for airport construction shall be controlled as necessary to prevent inadvertent or unauthorized entry of persons, vehicles or animals onto air operation areas (AOA). No vehicle shall enter the air operations area except at predetermined locations. The amount of construction traffic will require the contractor to use a security guard at access gates and a flag person to control traffic crossing taxiways and other aircraft movement areas. Contractor personnel who operate vehicles in the AOA shall comply with the owner's rules and regulations for vehicle marking, lighting, and operation.

   No vehicle shall operate within the Security Identification Display Area (SIDA):

a) Unless operated by an individual in possession of a valid Security Identification Display Area (SIDA) badge with an Airport Operations driver's license or, under the direct escort of someone who is:

b) In a careless or negligent manner.

c) With disregard of the rights and safety of others.

d) At a speed or in a way which endangers persons or property.

e) While the driver is under the influence of drugs or alcohol.

f) If such vehicle is loaded or maintained as to endanger persons or property.

8. MARKING AND LIGHTING OF VEHICLES

a) All contractor vehicles shall have operating head lights, tail lights and brake lights. Head lights shall not be set on high beam when moving about the airport.

b) All contractors and sub-contractors vehicles must display in full view, company logos, affixed to each side of the vehicle while operating inside the Security Identification Display Area (SIDA). Company logos must be no less than six (6) inch lettering, or twelve (12) inch company logo and can be magnetic, printed or painted on, but must be commercially made.

c) All construction vehicles/mechanized equipment authorized within the movement area or related safety areas shall be marked with a 3' x 3' orange and white checkered flag with each box being 1' square, located on the uppermost portion of the vehicle/motorized equipment, or be escorted by a vehicle so equipped.

d) During nighttime hours, all equipment operating on the airport exceeding 15 feet in height shall be lit with a red obstruction light located on the uppermost portion of the equipment.

e) Vehicles/mechanized equipment authorized on the movement area (runways, taxiways, and ramps) and/or associated safety areas shall be equipped with an electrically powered, amber color, 360-degree omni-direction light, mounted on the vehicle such that it is conspicuous from any direction.

f) All vehicle marking and lighting must comply with the most recent version of Advisory Circular 150/5210-5 "Painting, Marking and Lighting of Vehicles Used on an Airport."

9. REQUIRED ESCORTS

a) The contractor must provide an adequate number of escorts for material deliveries along haul routes and the movements of the contractor's vehicles/mechanized equipment and personnel within the movement area and non-movement areas as authorized by the SAT airfield operation units.

b) During any absence of the approved escort(s) or for periods that they are unable to perform their specified duties, all work within the movement area and associated safety areas for projects shall stop. Additionally, all personnel and equipment shall be escorted to approved locations outside the movement area and related safety areas. No contract time extension will be granted for time lost due to the absence of escort(s). Work shall resume only with the return of the approved escort(s).

c) The escort shall assure that all equipment maintains proper clearances from moving aircraft.

10. TRAINING REQUIREMENTS FOR SIDA BADGES AND AIRPORT OPERATIONS DRIVERS LICENSE

a) Contractor employees who require access to the construction site are required to be SAT SIDA badged by Airport Security and must attend the Security Identification Display Area (SIDA) training, and must pass the computerized test to obtain a SAT SIDA badge. Hours of Operation at the Airport Security Badge & Identification office are:

- Monday thru Thursday 8 AM to 4 PM
- Friday 8AM to 11:30 AM lunch 1 PM to 4 PM

All contractors and sub-contractors personnel that are to be issued a Security Identification Display Area (SIDA) badge are required to attend and successfully complete a training class before being issued and SAT SIDA badge. Fees for the SAT SIDA badge include attendance with the associated training class.

The types of training required will be determined by the scope and location of the work involved. All personnel that will receive Airport badges shall attend the security training. Additionally, personnel operating vehicles or equipment within the Security Identification Display Area (SIDA) must attend Airport Operations Driver training.

11. TWO-WAY RADIO COMMUNICATIONS PROCEDURES

a) At no time should the Contractor have a two-way radio communications with the air traffic control tower. If a need arises, the Contractor shall contact Members of SAT operations who will be on site for the duration of the project. SAT operations call and communicate with the tower. This procedure will be discussed at the Pre-Construction meeting in detail to which the Contractor shall follow while in the AOA. Emergencies and operating conditions may necessitate sudden changes, both in airport operations and in the operations of the contractor. Aircraft operations shall always have priority over any and all of the contractor's operations. Should runways or taxiways be required for the use of aircraft and should airport operations, the control tower, or the engineer deem the contractor to be too close to active runways or taxiways the contractor shall suspend his operations, remove his personnel, plant, equipment, and materials to a safe distance and stand by until the runways and taxiways are no longer required for use by aircraft. There will be no compensation for delays or inefficiencies due to these changes.

b) For project scheduling, the contractor shall schedule daily with Airport operations and the Resident Engineer.

12. MAINTENANCE OF THE SECURITY IDENTIFICATION DISPLAY AREA (SIDA) AT THE SAN ANTONIO INTERNATION AIRPORT (SAT)

a) The contractor shall delineate work limits within these areas as per the phasing plan. Confine men, equipment and materials outside of the runway safety area (RSA) when the runway is active. Confine men, equipment and materials outside of the taxiway safety

area (TSA) when the taxiway is active. Work site will generally be enclosed with barricades and safety fence. See the specifications for special conditions and for other conditions relating safety.

b) The contractor shall have access to the airport only at those locations designated on the plans. All other access shall be by special request and subject to approval by the Aviation Department. The contractor will provide a SIDA badge person to provide access control at the contractor's access gate, and at NO time shall any access gate onto the SIDA be unlocked or opened without a SIDA badge person controlling access.

E. WILDLIFE MANAGEMENT

The Contractor will be required to follow any Airport Wildlife Management Procedures that are in place, but at a minimum the Contractor will be required to:

1. Contractor shall instruct employees not to discard food or other trash on or around work sites that could attract wildlife in the dumpsters and trash can provided by the Contractor on site. Contractor employees shall not intentionally feed any wildlife while working at the airport.

2. Contractor shall properly seal all trash containers at work sites such that wildlife cannot gain access to containers during non-construction periods.

3. Contractor shall notify airport operations division staff if large numbers of birds or significant wildlife are observed at work sites. Contractor shall immediately notify operations staff if deer are sighted within the airfield fence.

4. Contractor shall provide and install seeding in compliance with contract Specification T-901 of the contract documents. The grass shall be maintained throughout the duration of the project by the contractor at no cost to the owner.

5. Close and lock any airfield access gates that are not in use.

F. FOREIGN OBJECT DEBRIS MANAGEMENT

1. Since this project will require the contractor to cross active taxiways, the contractor shall have available at all times multiple vacuum type mechanical sweeper and water truck to clean all

taxiway and apron pavement of dirt, stones, and loose debris where construction traffic crosses at all active movement areas. No direct pay will be made for vacuum and water trucks or for pavement cleaning.

2. No debris shall be allowed to remain on the roadways or airport paved surfaces. Active taxiways and aprons shall be kept free of debris at all times. Contractor shall maintain one power vacuum sweepers on site for every active taxiway crossed. Other pavements shall be cleaned by the contractor daily, and as required, using power vacuum sweepers to keep all access and construction areas clear of soils, clods, or other debris. Payment for vacuum sweeping and cleaning of runway, taxiways and/or aprons is incidental to Special Provision Specification item SP-10-1 Airport Safety and Security.

3. The contractor shall have available on-site at all times a method of periodic spraying of any stockpile or exposed areas to limit dust. 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 insure compliance.

G. HAZARDOUS MATERIALS MANAGEMENT

1. Hazardous materials can be identified using the U.S. Department of Transportation (DOT) labeling and identification system. All hazardous materials arriving on site must be properly labeled, stored, and managed as required by the material safety data sheet (MSDS) for that material, or as directed by City of San Antonio Aviation Department and the airport's fire, environmental and risk management.

2. All wastes shall be properly stored, labeled, managed, and disposed of in accordance with the project specifications, local requirements, and Texas Commission of Environmental Quality (TCEQ) regulations, or as otherwise directed by the City of San Antonio's environmental personnel.

3. Contractors and subcontractors are required to have copies of all MSDSs for all materials brought on site.

4. If suspect unknown hazardous materials are identified, then the job should stop until further direction by the City of San Antonio's environmental and risk management departments.

5. If potentially hazardous waste/materials have been indicated in the bid documents and could be foreseen in a project, proposal, or work order, then the contractor is expected to have onsite the proper personal protective equipment and instruments for detection and safety.

6. Projects that include abatement or remediation must have their own specific job plans.

7. Contractor to immediately report spills to airport operations and TCEQ. Reports are to conform to TCEQ requirements.

H. NOTIFICATION OF CONSTRUCTION ACTIVITIES

1. Prior to commencement of construction activity, the contractor shall notify in writing, at least 72 hours in advance, Aviation Department operations and the engineer of its intentions to begin construction, stating the proposed time, date, and area of which construction is to occur in order for the appropriate notice-to-airmen (NOTAM) to be issued. During the performance of this contract, the airport facility shall remain in use to the maximum extent possible. The contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized persons to enter in any airport area which may be open for aircraft use.

2. The contractor shall notify airfield operations on a daily basis to inform them of the daily construction activities and shall call them at the desk at (210) 413-4928 if there are any un-expected changes or delays

3. Responsible representative/points of contact will be distributed to the Contractor at the Pre-Construction meeting. The following is a list of some of the necessary information that will be provided.
    a) Aviation Department
        - Airfield operations –
        - Airport fire –
        - Airport security -
        - Project manager -
        - Senior project supervisor -

b) Construction administration

- Resident project representative -
- Senior construction observer -
- Construction observer –
- Project manager -
- Project engineer -
- Project engineer -
- Electrical engineer -

c) Contractor

- TBA

4. NOTAMS

a) In order for the contractor to operate within airport property, appropriate notices to airmen (NOTAM) must be issued by the Aviation Department through the FAA flight service station. These notices provide information on closed, limited, or hazardous conditions to airmen and users of the airport. A 5-day notice is required for issuance of the proper NOTAM; all construction operations must be closely coordinated with the engineer for NOTAM issuance.

5. EMERGENCY NOTIFICATION PROCEDURES

a) The contractor shall immediately call the Airport Operations Control Center at 207-3433 if an accident occurs with injuries on airport property.

b) The contractor shall also immediately notify SAT airfield operations to coordinate all emergency efforts.

c) Within 24 hours, the contractor shall report all accidents to Aviation Department airfield operations, the construction management team, the Aviation Department senior project supervisor, Aviation Department project manager and Aviation Department safety risk management officer

6. COORDINATION WITH ARFF

a) The contractor shall immediately call the Airport Operations Control Center at 207-3433 if a fire occurs on airport property. The contractor shall not attempt to fight the fire beyond what may be doused by use of a fire extinguisher. .

b) Non-emergency communication with the SAT ARFF will be coordinated by the City of San Antonio Aviation Department construction administration team.

c) A SAT ARFF representative will be invited to attend the preconstruction conference at which time the overall construction schedule will be presented.

d) A meeting will be scheduled with the SAT ARFF representative prior to the start of each major construction phase which significantly impacts/modifies airfield closures throughout the duration of the construction project. Participants in these meetings shall include: airport staff, airport operations, design team, construction administration team, contractor, and subcontractors.

7. NOTIFICATION TO THE FAA

a) The contractor's use of cranes, boom trucks, concrete pump trucks, drill rigs and other tall objects will require submittal and approval by the Aviation Department and engineer. Dependent on the location and usage, the equipment may require FAA airspace review as submittal on FAA form 7460-1 notice of construction.

b) The contractor shall submit an FAA form 7460-1 at least 60 days prior to any crane erections. All construction involving cranes shall further be coordinated at least 72 hours in advance, excluding weekends, with the applicable SAT airfield operation division or Aviation Department planning, design, and construction division. This does not include the time required for airspacing. The following information and actions are required:

- Location of the crane.
- Maximum extendable height.
- Hours of operation.
- The top of each crane boom shall be marked by a 3' x 3' orange and white checkered flag -- each box being 1' square.
- Each crane shall be lowered at night and during periods of poor visibility as directed by Aviation Department airfield operation units or Aviation Department planning, design, and construction division. In the event the crane is approved to remain extended during the hours from sunset to sunrise, the highest point of the crane boom will be lit with a red obstruction light in accordance with AC 70/7460-1.

c) The City of San Antonio Aviation Department will submit to the FAA for approval a notice of construction (7460-1) for the staging area, limits of construction, and stockpiling area as show on the plans.

I. INSPECTION REQUIREMENTS

1. Aviation Department personnel and/or the engineer's field personnel will conduct routine inspections of all construction areas to ensure compliance with airfield safety. Daily inspections will be required for areas requiring haul routes over active airfield pavements to insure that FOD is minimized. In addition, daily inspections of Contractor access areas will be performed to help insure safety onto the airfield. Daily inspections will be conducted by an Airport Operations employee, a Contractor representative, and a Construction Administration field representative.

   All discrepancies noted in the inspection must be corrected to the satisfaction of the Engineer 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 so as to avoid prolonging the continued closure of the areas.

2. The construction administration team will monitor the contractor's activities for conformance with the contract documents.

3. The contractor shall assign a safety officer to the project to conduct daily inspections of all construction areas to ensure conformance with the construction safety and phasing plan (CSPP) and safety plan compliance document (SPCD).

4. FREQUENCY OF INSPECTION
   a) Self-inspections are performed daily by Aviation Department's personnel and/or the engineer's field personnel.
   b) Additional safety inspections shall be conducted whenever required by the following circumstances:

- During and after construction activity
- During rapidly changing meteorological conditions
- Immediately after any incident or accident
- After any unusual condition on the airport

5. REPORTING SYSTEM
    a) Any corrective action needed for unsafe airport conditions will be reported to airfield operations and followed up with a written work order.

    b) Conditions which affect any airport tenants will be communicated via the airport's IDS4, direct digital entry NOTAM, airport operations NOTAM system and airport status report.

6. INSPECTION RECORDS
    a) Inspection records will show the conditions observed and all corrective action taken.

    b) Inspection records will be maintained in the final Engineer's report.

J. UNDERGROUND UTLILITIES

The Contractor is required to Blue Stake and pothole (if necessary) all existing utilities within the project area prior to the beginning of any construction activities on the airfield. Protection of utilities may include, but are not limited to, flagging utilities, marking lines on pavement, placement of barricades along utility lines and at manholes. A detailed Technical Specification has been provided to the Contractor for additional requirements.

1. Prior to commencing any excavation (on or off AOA), drilling (on or off the AOA), driving fence posts (along the AOA), trenching (on or off the AOA), saw cutting (AOA only), the contractor shall review drawings with City of San Antonio Aviation Department personnel and/or the engineer's personnel to insure that all underground obstructions and utilities are identified. In addition the contractor shall contact miss dig and coordinate with the City of San Antonio Aviation Department to assign the verification of utilities by airport maintenance. Both miss dig and airport maintenance and the contractor shall attempt to locate utilities. The contractor will be completely responsible for all damage to underground utilities.

2. Each utility shall be swept/identified in the following manner:

a) Flags can be used but shall be color coordinated. In addition the "acronym" for that utility shall be written on one side of the flag with a permanent marker.

b) Stakes can be used. The top two inches of the stake shall be painted in color. In addition the "acronym" for that utility shall be written on one side of the stake with a permanent marker.

c) Painting is only authorized on asphalt, concrete, and metal surfaces. Markings shall be color coordinated. The acronym for the utility shall be used for each utility. A line that shows the direction of the utility shall emanate from the acronym in each direction.

3. If abandoned the Contractor shall still stake, mark, or flag but write down "aband" before the abbreviated prefix indicated above.

4. The individual marking, staking, or flagging shall mark the utilities in a way that coincides with the drawings.

5. If a utility or any underground obstruction is found it shall be reported immediately to the engineer or the owner's project supervisor.

6. Contractor employees in an excavation shall be protected from cave-ins by an adequate protective system unless the excavation is:
   a) Made entirely of stable rock, or

   b) Less than 5 feet deep and determination has been made that there is no potential for a cave-in.

7. Excavation shall be protected using proper barricading materials which shall be installed a minimum of 6 feet back from excavation (unless in conflict with airfield requirements). Barricade material can be wood, steel cables, or chain supported at intervals so that the barricade does not sag or droop below the required height. Caution tape is not an approved barricade material. Guardrail/jersey barriers may be required and shall provide a top rail, mid rail, and toe board at proper elevations and be able to withstand a minimum 200 pound of force without collapsing.

8. The contractor is responsible for documenting utility information for use during construction and preparation of as-builts.

PENALTIES

1. In the event that a report is received of unauthorized vehicles or persons on the airport operations area, an airport vehicle will be dispatched to intercept and escort the violator from the premises. A report will be prepared and kept on file concerning all incidents.

2. Continuous surveillance shall be maintained to ensure that only authorized vehicles operate on the movement area and that established rules are complied with. Should an individual violate the airports procedure on the operation of ground vehicles or should an individual have a runway incursion, their Airport Operations driver's license shall be confiscated immediately.

3. The individual will not be authorized to re-enter the movement area until a letter is forwarded to the office of the CEO or his designee from the supervisor of the individual committing the violation. The letter must indicate that the individual has been counseled on the severity of the violation and has received recurrent training from the company.

4. The Airport Operations driver's license of the individual involved will not be returned until the individual has attended another ground vehicle operations class conducted by the airport training department and passed a written exam.

5. Any individual's failure to complete recurrent movement area training within any 12 consecutive calendar month period will result in suspension of that individual's airport operations area (AOA) driving privileges until such time as the individual completes the required training.

6. The director of airfield operations or his/her designee will notify the individual and their supervisor in writing that the individual's AOA driving privileges have been suspended for failure to complete required movement area training.

K. SPECIAL CONDITIONS

1. During non-working hours and/or weather conditions approaching 1,000 foot ceilings (broken or overcast) or 3 mile visibility, all men, equipment and materials shall be pulled back to a position that is a least 250 feet from an active runway centerline. At no time shall equipment be operated or remain within 400 feet of an active centerline if its height (highest elevation) would exceed 25 feet above the active centerline elevation. The contractor will receive notification from SAT operations who will be informed by the air traffic control tower (ATCT) when visibility conditions require, or are expected to require equipment pullback. Current sky conditions at SAT can be checked by the contractor anytime by calling (210) 805-5583 and listening to the recording.

2. During special events as designated by airport operations or in emergencies, the contractor maybe required to stop work and vacate the construction site as directed by the Aviation Department. Notification will be given by the Aviation Department to the contractor when work will be able to resume.

3. 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 all clear to do so.

L. RUNWAY AND TAXIWAY VISUAL AIDS

1. Runways closed to aircraft operations will have portable lighted runway closure markers over each of the runway designations on each end and temporary closed runway markers placed periodically the length of the runway. For the closure of Runway 12R-30L the Runway 30L pavement markings will be removed. This is required because a lighted X cannot be placed over these markings because it is in the Runway 4-22 Safety Area. Because of this two sets of lighted X's will be placed as shown in the plans and discussed with Airport Operations and the ATCT. The contractor shall provide all lighted X's and The Contractor shall be responsible for maintaining and providing fuel for the lighted X's as needed2. Pavements closed to aircraft

operations will be delineated with low profile barricades and temporary taxiway ending markers at each intersection. Lighting for low-profile barricades used within the AOA shall be red and shall be a steady-burn or flashing light. Lighting used for construction barricades shall be red, and shall be a steadyburn or flashing light. All barricading and lighting shall conform to the details in the plans and specifications. Low-profile barricades shall be spaced per the plans for the specific requirement and shall be placed to prevent ground vehicle traffic from unintentionally moving onto active airfield pavements, and alert aircraft traffic of closed facilities. Locations and placement of barricades shall be placed as shown the Phasing plans

2. Airfield guidance signs for runways and taxiways that are closed will either be removed or covered.

3. Airfield lighting for runways and taxiways that are closed will either be either de-energized or disconnected.

4. All centerline markings leading into the construction area will be obliterated.

5. All permanent and temporary pavement markings will be in compliance with ac 150/5340-1K "Standards for Airport Markings.

6. All permanent and temporary lighting and signage will be in compliance with ac 150/5340-30 design and installation details for airport visual aids and 150/5340-18 standard for airport sign systems.

M. MARKING AND SIGNS FOR ACCESS ROUTES

1. Access routes to and from the construction site are as shown on the operational plans.

2. The contractor shall provide a traffic control plan that includes marking and signage per MUTCD standards.

   Temporary signing used for Contractor access/haul routes, open trenching or other hazards shall be clear, concise, reflective, and large enough so as to minimize safety-related issues. All

temporary signing shall meet the requirements of the most current version of the MUTCD, and shall be frangible.

N. HAZARD MARKING AND LIGHTING

1. HAZARD MARKING

Hazard-marking barricades, traffic cones, flashers, etc. Should be used: to identify and define the limits of construction making them visible to aircraft, personnel, or vehicles; to identify hazards such as open manholes, small areas under repair, stockpiled material, waste areas, etc.; to prevent aircraft from taxiing onto a closed taxiway; and to identify FAA, airport, and national weather service facilities, cables, power lines, instrument landing system (ILS) critical areas, and other sensitive areas to prevent damage, interference, and facility shutdown. Hazardous areas, in which no part of an aircraft may enter, should be indicated by the use of barricades marked with diagonal, alternating orange and white stripes. The barricades should be supplemented with alternating orange and white flags, and installed so that they are always in the extended position and properly oriented. During reduced visibility or night hours, the barricades should be supplemented with flashing yellow lights. The intensity of the lights and spacing for barricades, flags, and lights should be adequate to delineate the hazardous area without ambiguity. The contractor shall have a designated person on call 24-hours a day for emergency maintenance of airport hazard lighting and barricades.

2. MARKING AND LIGHTING

Low profile lights retroreflective taxiway edge markers, low level barricades, and warning flags shall be provided and erected by the contractor as shown on the plans or as directed by the engineer. All construction areas, including closed taxiways, should be clearly and visibly separated from active air operation areas. Hazard areas, facilities, cables, and power lines should also be clearly identified by the contractor. The contractor is responsible for maintaining the condition and visibility of all markers identifying above-mentioned areas and that marking and lighting aids remain in place. Alternating orange and white flaglines, traffic cones, omnidirectional yellow flashers, and/or signs should be used as necessary to clearly separate all construction/maintenance areas from other parts of the AOA. All barricades, temporary markers, flaglines supports, and other objects placed and left in safety areas on any open taxiway, or taxilane should be: as low as possible to the ground; of low mass; easily collapsible upon contact with an aircraft or any of its components; weighted down or sturdily attached to the surface to

prevent displacement from propwash, jet blast, wing vortex, or other surface wind currents; and if affixed to the surface, frangible at ground level.

3. EQUIPMENT

a) LOW PROFILE BARRICADES

- The contractor shall provide low profile barricades along runway or taxiway edges wherever open excavations or irregular grades are left within the safety area of an active runway or taxiway or where temporary pavement closures or aircraft limitations are required. Barricades along active apron or taxiway pavement shall be placed approximately 10 feet from the edge of the full strength pavement, where possible, or as shown on the operational and phasing plans or as determined by the engineer and airport operations to delineate the contractors work areas. Gap between barricades shall be no more than 4 feet end to end. No gaps are allowed between barricades located adjacent to runway safety areas.
- The contractor shall maintain the lights and barricades in an operable condition for the duration of the project.
- All barricades shall be checked visually for signs of wear and tear on a weekly basis and shall be repainted and/or replaced when deemed appropriate by the engineer. The condition of lighting units shall be checked daily. All light fixtures shall be verified operating by the contractor on a daily basis before the contractor ceases operation for the day. The areas around all barricades shall be cleaned at least once each week and the contractor shall sweep up accumulated debris and remove it from the site. All activities conducted adjacent to active runways or taxiways shall be coordinated with the engineer.
- Barricades shall be as shown on details. All incidental connectors, spacers, splice plates, etc., shall be painted white.
- Alternate forms of barricades may be proposed by the contractor which meets these functional requirements. Approvals of any such substitution (if granted) shall be by the airport's operations department and the engineer.
- The final location for the barricades shall be established in the field with concurrence from the engineer and airport operations.
- The contractor shall have replacement barricades, lights and batteries on site and shall replace barricades, lights and/or batteries within one hour of notification by the engineer or airport personnel. Contractor shall provide the name and telephone number for an on-

call representative 24 hours per day, seven days per week to replace barricades, batteries and inoperative lights.

- Red steady burn lights shall be placed at the ends and at corners of each line of barricades; all other lights on barricades shall be red flashing.
- Contractor shall be responsible for maintaining proper positioning of all barricades.
- Sandbags and/or anchors may be required to hold the barricades in place where exposed to jet blast.
- All costs associated with furnishing, placement, maintenance and subsequent relocation of the low profile barricades are incidental to the requirements of item airport safety.

b) LIGHTED RUNWAY CLOSURE MARKER SHALL:

- Be placed over the runway numbers at all times when the runway requires a closure. The runway closure marker may be moved off of the runway numbers only when required by construction activity and then immediately replaced when the construction activity is complete but no later than sunset each day. Lighted X's shall be fueled and maintained as necessary each day by the contractor.
- Be a portable, towable unit that can be quickly removed from the runway.
- Consist of clear incandescent lamps or transmit a white color, arranged in the shape of a letter "X" with arms crossed at an appropriate angle to make the "X" discernible. The arms shall be painted yellow on all sides so that the unit will be clearly visible when it is in position.
- Be energized by a portable power supply with an alternating current (plug) option.
- Be controlled so that the lighted signal will flash at an approximate rate of 2.5-3 seconds "on" (+/-20%) and 2.5 seconds "off" (+/-20%).
- Provide the following daytime and nighttime visual reference during visual flight rule (VFR) conditions when placed on centerline and within 250 feet of the runway end:
    i. Visible to the pilot at a range of at least 5 nautical miles.
    ii. Recognizable as a letter "X" from a range of at least 1 nautical mile.
- Provide lamp dimming capability for nighttime operations.
- Produce a signal that provides a horizontal coverage to at least 15 degrees on each side of the runway centerline, and a vertical coverage from 0 degrees to 10 degrees above horizontal, both day and night, at a range of 1 nautical mile.

- Adjustable aiming and leveling to allow tilting to an optimum angle of 3 degrees from vertical.

O. PROTECTION OF RUNWAY AND TAXIWAY SAFETY AREAS, OFA'S, OFZ'S AND APPROACH SURFACES

1. Construction within Runway and Taxiway Safety Areas

   No construction activities may occur within any active Runway or Taxiway Safety Areas without taking the appropriate measures to close the runway or taxiway. These measures include strict coordination with the Airport, ATCT and the Engineer. Although not anticipated for this project, if the Contractor requests to perform work outside of the current construction area that would impact an active Safety Area, a minimum of at least a 48-hour notice to the Airport is required.

2. Adjustment of RSA's and TSA's

   No adjustments to the RSA's and TSA's are anticipated for this project.

3. 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.

4. Requirements for Open Trenches

   Although not anticipated for this project, no trenches shall be left open within active RSA's and TSA's. Any trenching within an RSA or TSA needing to be left open after the Contractor leaves the work site for the day shall be properly plated and capable of safely supporting aircraft traffic, but it is the intent that this be a unique situation with very limited occurrences. Any requests of this type shall be submitted in writing to the Engineer at least 48 hours prior to the construction. The Engineer will confer with the Airport and the FAA, and any decision related to the particular situation at hand shall be final.

   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 250 feet parallel to an active runway centerline (trenches/excavations within 200 feet of a runway centerline require a runway closure).
- Within 107 feet parallel to a taxiway centerline.
- Open trenches not to exceed 500 feet in length at any one time.

5. Appropriate Covering of Excavations within RSA's and TSA's

   All excavated areas will be within the closed portions of Runway 30L and connecting taxiways. No excavation will be required within active RSA's or TSA's.

6. Marking of Excavations and Open Trenches

   All potential hazards, including but not limited to, open trenches, manholes, and steep embankments shall be barricaded and lighted with 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 N for further information.

7. Maintenance of RSA's and TSA's

   Upon completion of the selected Base Bid and Alternatives, the Contractor is responsible for returning the affected RSA's and TSA's back to meet the requirements set by the FAA.

8. Construction Equipment not in Use

   Construction equipment not in use shall be returned to the Contractor's Staging Area by the Contractor, where practicable. In no case shall construction equipment be left within any Object Free Areas.

9. Construction within Taxiway Safety Areas

   No construction activities may occur within any Taxiway Safety Areas without taking the appropriate measures to close the subject facility. These measures include strict coordination with the Airport, ATCT and Engineer. Although not anticipated for this project, if the Contractor requests to perform work outside of the current construction area that would impact an active Safety Area, a minimum of at least a 48-hour notice to the Airport is required.

10. Taxiway OFA Construction Details

    Work within adjacent Taxiway OFA's is not anticipated as part of this project, but portions on connecting taxiways will be barricaded and closed until the project is complete in order to prevent

aircraft traffic from unintentionally entering the construction area. See *Construction Phasing Plan,* for barricaded and closed portions of connecting taxiways.

11. Penetrations of OFZ and Threshold Siting Surfaces

    Runway 12R-30L will be closed until the rehabilitation is complete.

12. Protection of Runway Approach and Departure Surfaces and Clearways

    The Approach/Departure for Runway 12R-30L will be closed until the Bias Bid portion of this project is complete and re-opened.

P. OTHER LIMITATIONS ON CONSTRUCTION

1. Open Flame Welding and Torches

   Open flame welding and the use of torches shall be approved by the Airport prior to the project commencing. Open flame welding and the use of torches may require a by the City of San Antonio, or the Airport's Aircraft Rescue and Fire Fighting (ARFF) department. If this type of work is required on this project, the Contractor shall notify the Airport.

2. Use of Flare Pots

   The use of flare pots is not permitted within the AOA at any time.

3. Use of Electrical Blasting Caps

   The use of electrical blasting caps is not permitted within 1,000 feet of the Airport property.

4. Airfield Lighting Vault Lock-Out/Tag-Out Policy

   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:

   a) The Airport electricians responding to a lock-out/tag-out request will coordinate with the ATCT through Operations.
   b) After Operations notifies electricians of closures, the SAT electricians will turn off the closed runways/taxiways using the airfield computer system.

c) 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 SAT.

d) 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.

e) The Electrical Contractor and SAT electricians must fill out lock-out/tag-out forms before leaving the Vault.

f) Upon completion of the lock-out, the Contractor will remove all locks and install the load breaks. All circuits must be verified operations in the manual mode on the regulator. Operations will perform a complete check of the lights in the field to verify actual operation.

g) When that has been completed, SAT electricians will notify SAT Operations when lock-in is complete and regulators are in remove control; Operations will notify the ATCT that they have control of the airfield lighting.

*This Procedure will be updated prior to construction.

5. 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 enters and is within the Security Identification Display Area (SIDA). .

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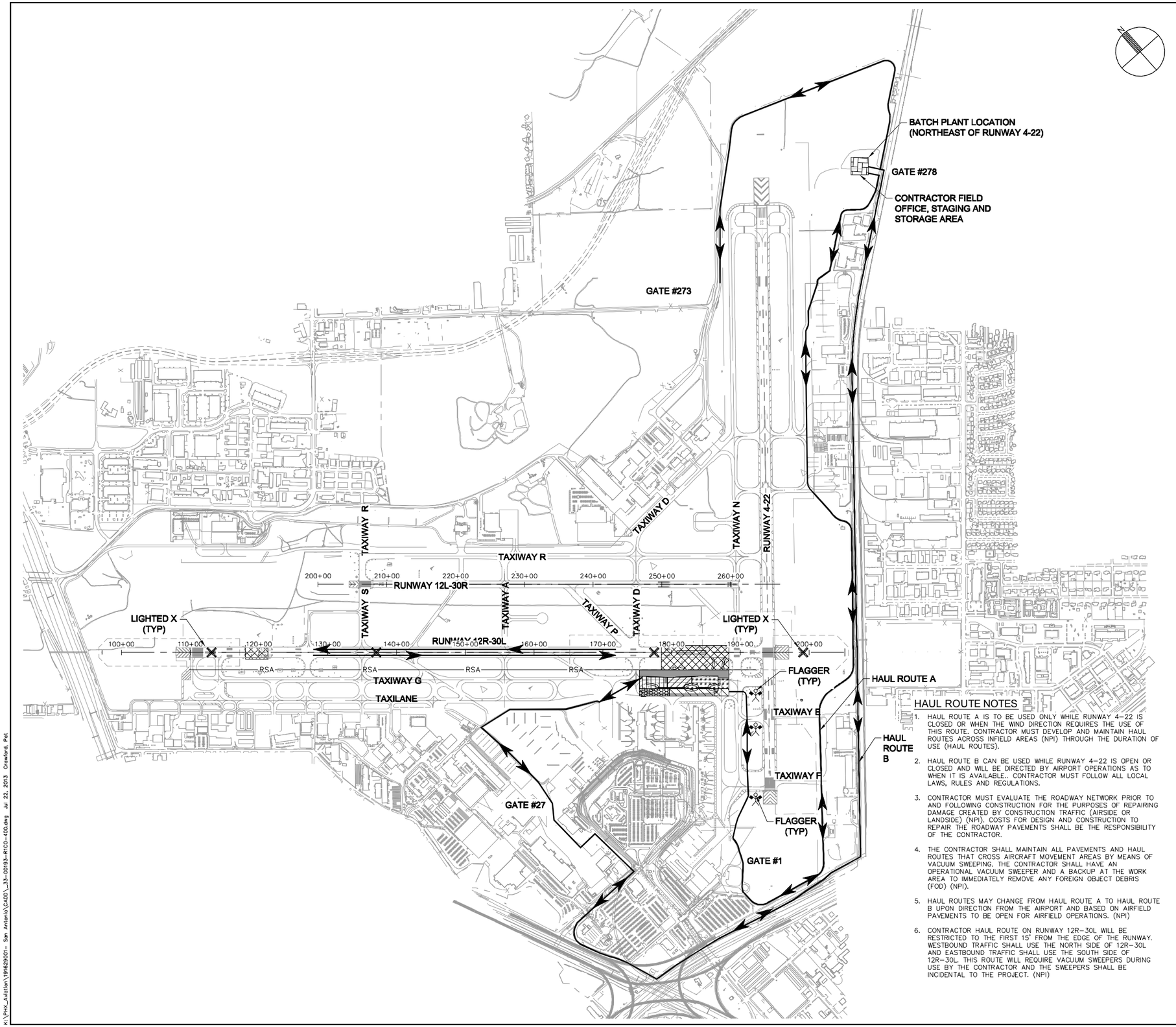

LEGEND

- BASE BID (RUNWAY 12R–30L REHAB AND TAXIWAY W)
- ALT 1 PHASE 1 (WEST PORTION INNER TAXILANE)
- ALT 1 PHASE 2 (EAST PORTION INNER TAXILANE)
- ALT 2 (TAXIWAY G)
- ALT 3 (TAXIWAY G)
- ALT 4 (TAXIWAY G)
- ALT 5 (SOUTH PORTION TAXIWAY W)
- CONTRACTOR FIELD OFFICE, STAGING AND STORAGE AREA
- HAUL ROUTE
- PORTABLE LIGHTED RUNWAY CLOSURE MARKER (PROVIDED BY THE CONTRACTOR)
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)

GENERAL NOTES

1. IT IS THE INTENT TO USE HAUL ROUTE A WHILE RUNWAY 4 IS CLOSED AND HAUL ROUTE B EITHER WHEN RUNWAY 4–22 IS OPEN OR CLOSED. HOWEVER, THE AIRPORT HAS THE AUTHORITY TO CHANGE THE HAUL ROUTES WHEN REQUIRED, DUE TO WIND DIRECTION AND TRAFFIC FLOW. THE CONTRACTOR WILL BE PROVIDED NOTICE OF THE CHANGE AS SOON AS PRACTICAL. NO ADDITIONAL PAYMENT WILL BE MADE FOR ALTERING THE ROUTE.
2. THE CONTRACTOR SHALL BE AWARE THAT CONSTRUCTION WILL BE ADJACENT TO ACTIVE AIRCRAFT OPERATIONS. CONSTRUCTION TRAFFIC SHALL YIELD TO AIRCRAFT AT ALL TIMES. THE CONTRACTOR SHALL NOT MOVE ANY EQUIPMENT ON ANY ACTIVE AIRPORT OPERATIONS AREA WITHOUT AN OPERATIONS OR MAINTENANCE STAFF ESCORT. DELAYS AND PRECAUTIONS RESULTING FROM AIRCRAFT MOVEMENTS SHOULD BE EXPECTED. EXPENSES ASSOCIATED WITH ANY DELAYS ARE INCIDENTAL TO THE PROJECT (NPI).
3. PORTABLE LIGHTED RUNWAY CLOSURE MARKERS (LIGHTED "X") WILL BE PROVIDED AND MAINTAINED BY THE CONTRACTOR THROUGHOUT THE DURATION OF THE PROJECT, REFER TO DETAIL 1, SHEET C2.9.
4. THE CONTRACTOR SHALL PROVIDE A LOW LEVEL CLOSED RUNWAY WATER FILLED X (SHERWIN INDUSTRIES CLOSURE X60 OR EQUAL) FOR THE RUNWAY 30L END CLOSURE.
5. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN LOW PROFILE BARRICADES, LIGHTS AND FLAGS FOR RUNWAY/TAXIWAY CLOSURES AS INDICATED ON THE CONSTRUCTION PHASING PLANS, REFER TO DETAIL SHEET C2.9. THE CONTRACTOR SHALL PLACE THE LOW PROFILE BARRICADES AS SHOWN ON EACH PHASING PLAN OR AS DIRECTED BY THE SAT OPERATIONS PRIOR TO BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING PROPER POSITIONING OF LOW PROFILE BARRICADES THROUGHOUT THE DURATION OF THE PROJECT (NPI).
6. THE CONTRACTOR SHALL COORDINATE WITH OPERATIONS AND MAINTENANCE STAFF TO COVER AND PROTECT ANY EXISTING GUIDANCE SIGNS AND EDGE LIGHTS ASSOCIATED WITH CLOSED RUNWAYS AND TAXIWAYS. DAMAGE TO SIGNS AND EDGE LIGHTS SHALL BE REPLACED AT THE CONTRACTOR EXPENSE (NPI).
7. THE CONTRACTOR SHALL REMOVE THE LOW PROFILE BARRICADES AND UNCOVER THE GUIDANCE SIGNS AND EDGE LIGHTS UPON COMPLETION OF THE PROJECT. DAMAGE TO SIGNS AND EDGE LIGHTS SHALL BE REPLACED AT THE CONTRACTORS EXPENSE (NPI). ADDITIONAL LOW LEVEL BARRICADES TO BE LEFT IN PLACE AND MAINTAIN BY THE AIRPORT ARE SHOWN IN EACH PHASE OF THE PROJECT.
8. CONTRACTOR IS RESPONSIBLE FOR THE SECURITY OF THE BATCH PLANT LOCATION. ALL MEASURES TO SECURE THE BATCH PLANT ARE THE RESPONSIBILITY OF THE CONTRACTOR.
9. THE CONTRACTOR SHALL PROVIDE GATE GUARDS IN ACCORDANCE WITH THE AIRPORTS STANDARDS AND REQUIREMENTS. COST FOR PROVIDING GATE GUARDS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THIS GUARD WILL NOT HAVE AUTHORITY OVER AIRPORT SECURITY WHILE ON DUTY. (NPI)
10. ALL VEHICLES WILL BE SUBJECT TO SEARCH BEFORE ENTERING THE SECURED AREA.
11. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO COORDINATE OFF–SITE ROUTES (STATE HIGHWAYS, COUNTY ROADS OR CITY STREETS) WITH THE APPROPRIATE OWNER WHO HAS JURISDICTION OVER THE AFFECTED ROUTE. ON–SITE HAUL ROUTES SHALL BE MAINTAINED BY THE CONTRACTOR AND SHALL BE RESTORED TO THEIR ORIGINAL CONDITION UPON COMPLETION OF BEING USED AS A HAUL ROUTE. THE CONTRACTOR SHALL PROVIDE APPROPRIATE TXDOT WARNING SIGNS PRIOR TO THE PROJECT ENTRANCE NOTIFYING THE TRAVELING PUBLIC. THESE SIGNS WILL BE REVIEWED AND APPROVED BY THE ENGINEER/AIRPORT AND BE PROVIDED FOR THE DURATION OF THE PROJECT. THESE SIGNS ARE CONSIDERED INCIDENTAL TO THE PROJECT. (NPI)
12. CONTRACTOR CAN TEMPORARILY STORE CONTAMINATED MATERIALS AT THE BATCH PLANT LOCATION PRIOR TO REMOVAL FROM AIRPORT PROPERTY. CONTRACTOR IS RESPONSIBLE TO PROTECT THE EXISTING SITE FROM CONTAMINATION AND REMEDIATE ANY ISSUES CAUSED BY STORED MATERIALS AT NO ADDITIONAL COST TO THE OWNER.

HAUL ROUTE NOTES

1. HAUL ROUTE A IS TO BE USED ONLY WHILE RUNWAY 4–22 IS CLOSED OR WHEN THE WIND DIRECTION REQUIRES THE USE OF THIS ROUTE. CONTRACTOR MUST DEVELOP AND MAINTAIN HAUL ROUTES ACROSS INFIELD AREAS (NPI) THROUGH THE DURATION OF USE (HAUL ROUTES).
2. HAUL ROUTE B CAN BE USED WHILE RUNWAY 4–22 IS OPEN OR CLOSED AND WILL BE DIRECTED BY AIRPORT OPERATIONS AS TO WHEN IT IS AVAILABLE. CONTRACTOR MUST FOLLOW ALL LOCAL LAWS, RULES AND REGULATIONS.
3. CONTRACTOR MUST EVALUATE THE ROADWAY NETWORK PRIOR TO AND FOLLOWING CONSTRUCTION FOR THE PURPOSES OF REPAIRING DAMAGE CREATED BY CONSTRUCTION TRAFFIC (AIRSIDE OR LANDSIDE) (NPI). COSTS FOR DESIGN AND CONSTRUCTION TO REPAIR THE ROADWAY PAVEMENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
4. THE CONTRACTOR SHALL MAINTAIN ALL PAVEMENTS AND HAUL ROUTES THAT CROSS AIRCRAFT MOVEMENT AREAS BY MEANS OF VACUUM SWEEPING. THE CONTRACTOR SHALL HAVE AN OPERATIONAL VACUUM SWEEPER AND A BACKUP AT THE WORK AREA TO IMMEDIATELY REMOVE ANY FOREIGN OBJECT DEBRIS (FOD) (NPI).
5. HAUL ROUTES MAY CHANGE FROM HAUL ROUTE A TO HAUL ROUTE B UPON DIRECTION FROM THE AIRPORT AND BASED ON AIRFIELD PAVEMENTS TO BE OPEN FOR AIRFIELD OPERATIONS. (NPI)
6. CONTRACTOR HAUL ROUTE ON RUNWAY 12R–30L WILL BE RESTRICTED TO THE FIRST 15' FROM THE EDGE OF THE RUNWAY. WESTBOUND TRAFFIC SHALL USE THE NORTH SIDE OF 12R–30L AND EASTBOUND TRAFFIC SHALL USE THE SOUTH SIDE OF 12R–30L. THIS ROUTE WILL REQUIRE VACUUM SWEEPERS DURING USE BY THE CONTRACTOR AND THE SWEEPERS SHALL BE INCIDENTAL TO THE PROJECT. (NPI)

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TEXAS REGISTERED FIRM,
NO. 928

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)

MICHAEL A. NORBY
87173
REGISTERED
PROFESSIONAL ENGINEER
07/22/13

MARK	DATE	DESCRIPTION
ISSUE:		-
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OVERALL PHASING PLAN

C2.1

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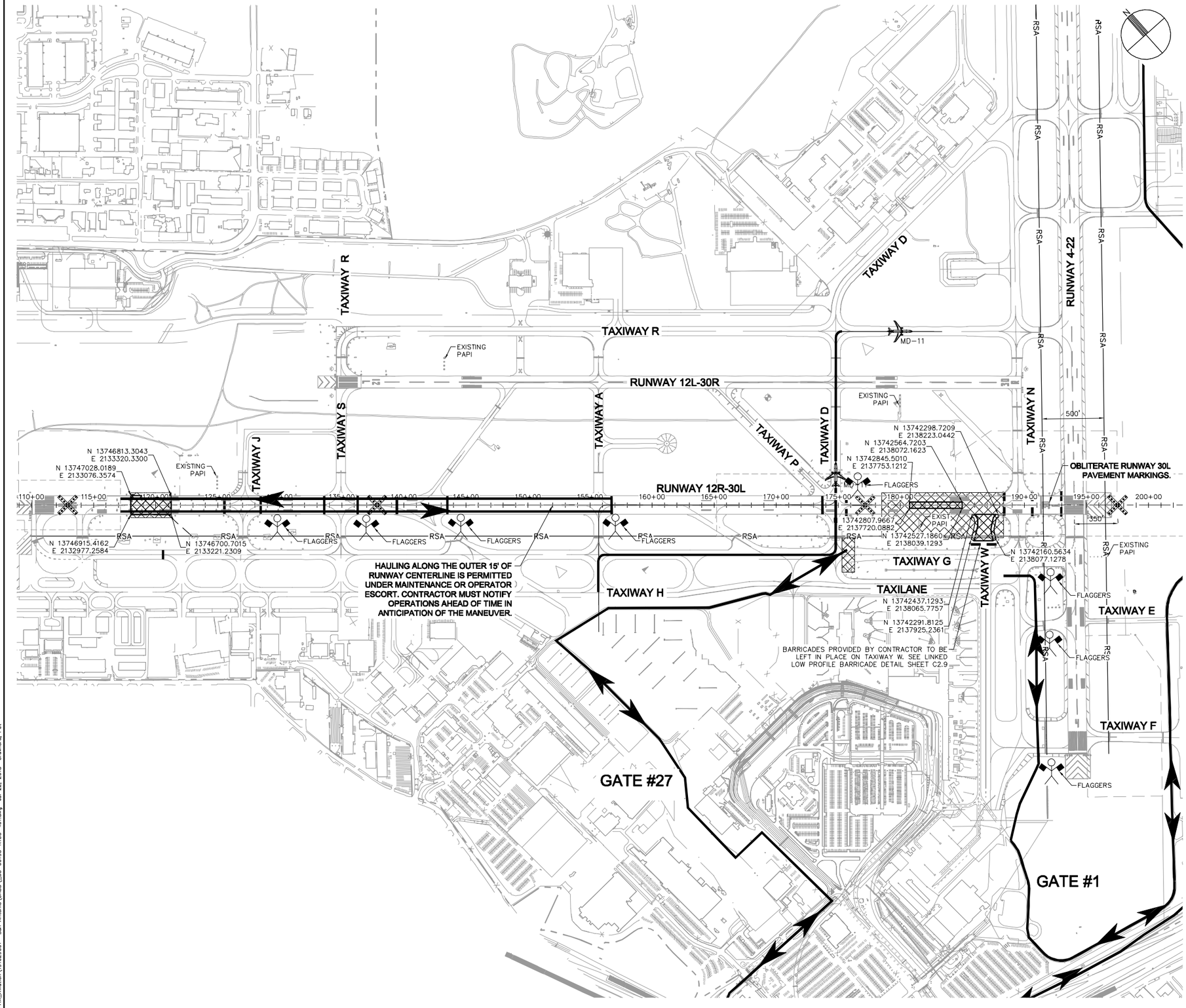

400 0 400 800
SCALE IN FEET

LEGEND:

- BASE BID
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- AIRCRAFT ROUTE
- PORTABLE LIGHTED RUNWAY CLOSURE MARKER
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

BASE BID NOTES

1. BASE BID CONSISTS OF ALL WORK ON RUNWAY 12R-30L BETWEEN STATION 118+00 AND 121+25 AND BETWEEN STATION 180+74 AND 180+99. NORTHING/EASTING COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF EACH PHASE. REFER TO HORIZONTAL CONTROL AND DEMO PLANS FOR PHASING LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED PER EACH PHASING SHEET FROM THE CENTERLINE OF RUNWAY AND TAXIWAYS.
3. RUNWAY 12R-30L WILL BE CLOSED TO AIRCRAFT OPERATIONS WHILE UNDER CONSTRUCTION.
4. RUNWAY 30L DESIGNATION MARKINGS SHALL BE OBLITERATED PRIOR TO BEGINNING THIS PHASE. OBLITERATION MUST TAKE PLACE AT NIGHT. DELAYS DUE TO OPERATIONS SHOULD BE EXPECTED.
5. LIGHTED RUNWAY CLOSURE "X'S" MUST BE PLACED ON THE RUNWAY NUMBERS ON THE WEST END (12R) AND 350' OFF THE EAST END (30L) OF THE RUNWAY AND TWO ADDITIONAL RUNWAY CLOSURE "X'S" MUST BE PLACED AS DIRECTED BY AIRPORT OPERATIONS (4 LIGHTED RUNWAY CLOSURE "X'S" TOTAL). X'S MUST BE MAINTAINED AND FUELED BY THE CONTRACTOR FOR THE DURATION OF THE PHASE WHILE THE RUNWAY IS CLOSED. LIGHTED RUNWAY CLOSURE "X'S" WILL REMAIN THE PROPERTY OF THE CONTRACTOR AT COMPLETION OF THE WORK.
6. BASE BID MAY NOT BE CONCURRENT WITH ANY OTHER PHASE PENDING NTP FROM THE AIRPORT. NTP WILL BE ISSUED FOR BASE BID PENDING FUNDING, ANTICIPATED WEATHER AND AIRPORT OPERATIONS.
7. BARRICADES MUST BE PLACED ACROSS THE RUNWAY ON BOTH SIDES OF EACH TAXIWAY CROSSING AT THE TAXIWAY OBJECT FREE AREA.

CITY OF SAN ANTONIO AVIATION DEPARTMENT

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TEXAS REGISTERED FIRM, NO. 928

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)

MICHAEL A. NORBY 87178 REGISTERED PROFESSIONAL ENGINEER
07/22/13

MARK	DATE	DESCRIPTION
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CONSTRUCTION PHASING PLAN BASE BID

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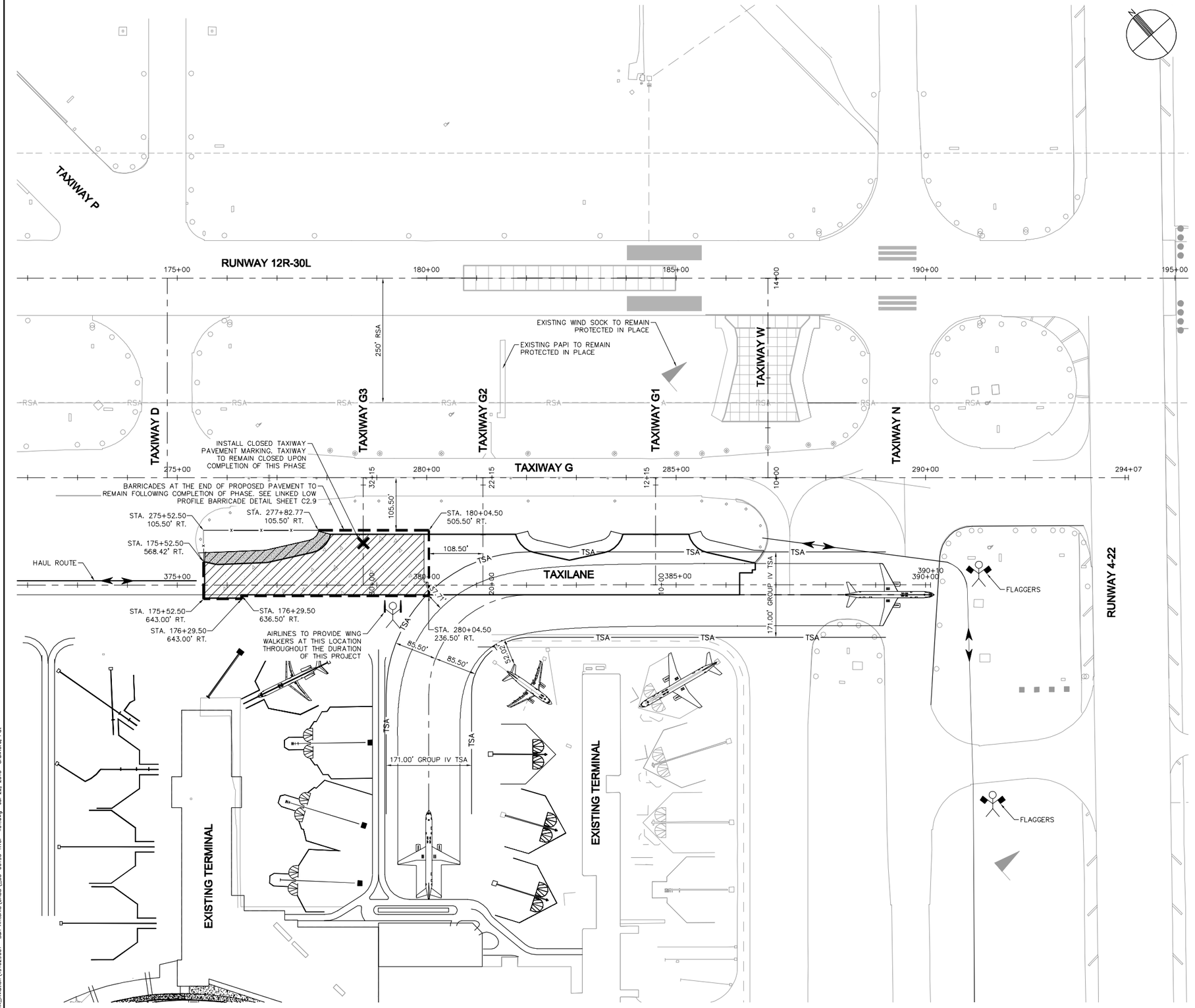

LEGEND:

- PHASE 1A
- PHASE 1B
- PORTLAND CEMENT CONCRETE PAVEMENT
- ASPHALT CONCRETE SHOULDER PAVEMENT
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)
- CLOSED RUNWAY/TAXIWAY PAVEMENT MARKING

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

ALTERNATE 1 PHASE 1A NOTES

1. PHASE 1A CONSISTS OF THE NORTHWEST PORTION OF WORK ON THE TAXILANE. STATION/OFFSET COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF EACH PHASE. REFER TO GEOMETRIC AND DEMO PLANS FOR CONSTRUCTION LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED 250 FEET (OR MORE) FROM THE CENTERLINE OF RUNWAY 12R/30L, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE INNER TAXILANE, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY G, AND 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY N.
3. THIS PORTION OF THE INNER TAXILANE BETWEEN TAXIWAY D AND THE TERMINAL APRON WILL BE CLOSED TO AIRCRAFT OPERATIONS UNDER THIS PHASE OF CONSTRUCTION.
4. TAXIWAY N, TAXIWAY G, TAXIWAY D, AND THE SOUTHEAST PORTION OF THE TAXILANE WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT. WING WALKERS WILL BE REQUIRED AT LOCATIONS SHOWN ON THE PLANS.
5. PHASE 1A CANNOT BEGIN UNTIL THE BASE BID IS COMPLETE AND ACCEPTED.
6. ANY WORK REQUIRED TO BE COMPLETED WITHIN A TAXILANE/TAXWAY SAFETY AREA WILL REQUIRE A TEMPORARY CLOSURE OF THE TAXILANE/TAXIWAY UNTIL THE WORK WITH THE SAFETY AREA IS COMPLETE.
7. THE CONTRACTOR SHALL PROTECT IN PLACE THE PAPI AND THE WIND SOCK. ANY DAMAGE TO THE EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE AIRPORT. THE CONTRACTOR MUST ALLOW ACCESS TO THESE FACILITIES BY THE FAA OR AIRPORT PERSONNEL FOR MAINTENANCE.

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TEXAS REGISTERED FIRM, NO. 928

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)

MICHAEL A. NORBY 87178 REGISTERED PROFESSIONAL ENGINEER
07/22/13

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CONSTRUCTION PHASING PLAN ALT 1 PHASE 1A

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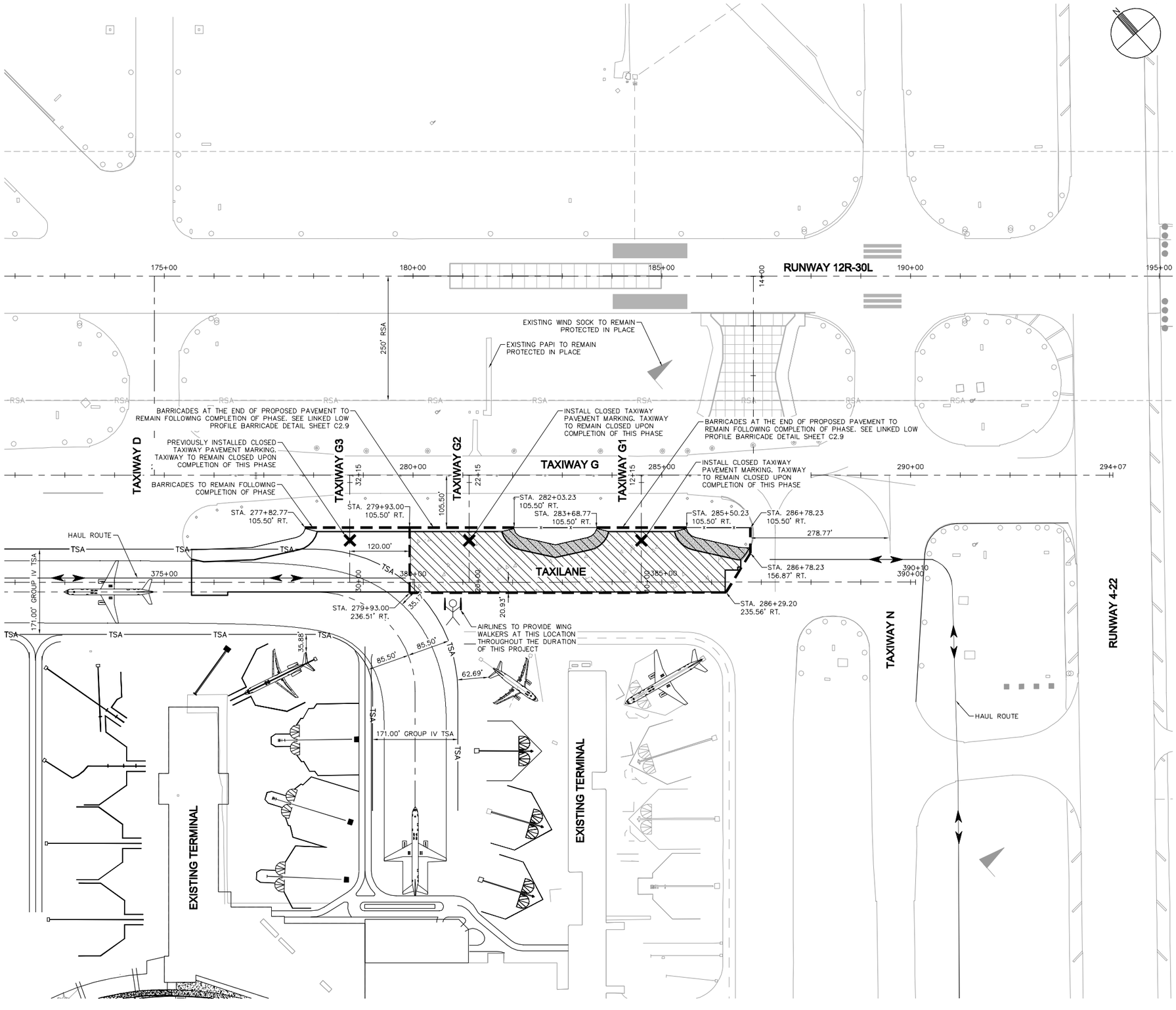

LEGEND:

- PHASE 1
- PHASE 2
- PORTLAND CEMENT CONCRETE PAVEMENT
- ASPHALT CONCRETE SHOULDER PAVEMENT
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)
- CLOSED RUNWAY/TAXIWAY PAVEMENT MARKING

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

ALTERNATE 1 PHASE 1B NOTES

1. PHASE 1B CONSISTS OF THE SOUTHEAST PORTION OF WORK ON THE TAXILANE. STATION/OFFSET COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF EACH PHASE. REFER TO GEOMETRIC AND DEMO PLANS FOR CONSTRUCTION LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED 250 FEET (OR MORE) FROM THE CENTERLINE OF RUNWAY 12R/30L, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE ACTIVE PORTION OF THE TAXILANE, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY G, AND 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY N.
3. THIS PORTION OF THE TAXILANE ADJACENT TO THE TERMINAL APRON WILL BE CLOSED TO AIRCRAFT OPERATIONS UNDER THIS PHASE OF CONSTRUCTION.
4. TAXIWAY N, TAXIWAY G, TAXIWAY D, AND THE NORTHWEST PORTION OF THE TAXILANE WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT. WING WALKERS WILL BE REQUIRED AT LOCATIONS AS SHOWN ON THE PLANS.
5. ALTERNATE 1 PHASE 1B CANNOT BEGIN UNTIL ALTERNATE 1 PHASE 1A IS COMPLETE AND ACCEPTED.
6. ANY WORK REQUIRED TO BE COMPLETED WITHIN A TAXILANE/TAXWAY SAFETY AREA WILL REQUIRE A TEMPORARY CLOSURE OF THE TAXILANE/TAXIWAY UNTIL THE WORK WITH THE SAFETY AREA IS COMPLETE.
7. THE CONTRACTOR SHALL PROTECT IN PLACE THE PAPI AND THE WIND SOCK. ANY DAMAGE TO THE EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE AIRPORT. THE CONTRACTOR MUST ALLOW ACCESS TO THESE FACILITIES BY THE FAA OR AIRPORT PERSONNEL FOR MAINTENANCE.

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RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)

MICHAEL A. NORBY
87178
REGISTERED PROFESSIONAL ENGINEER
07/22/13

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CONSTRUCTION PHASING PLAN ALT 1 PHASE 1B

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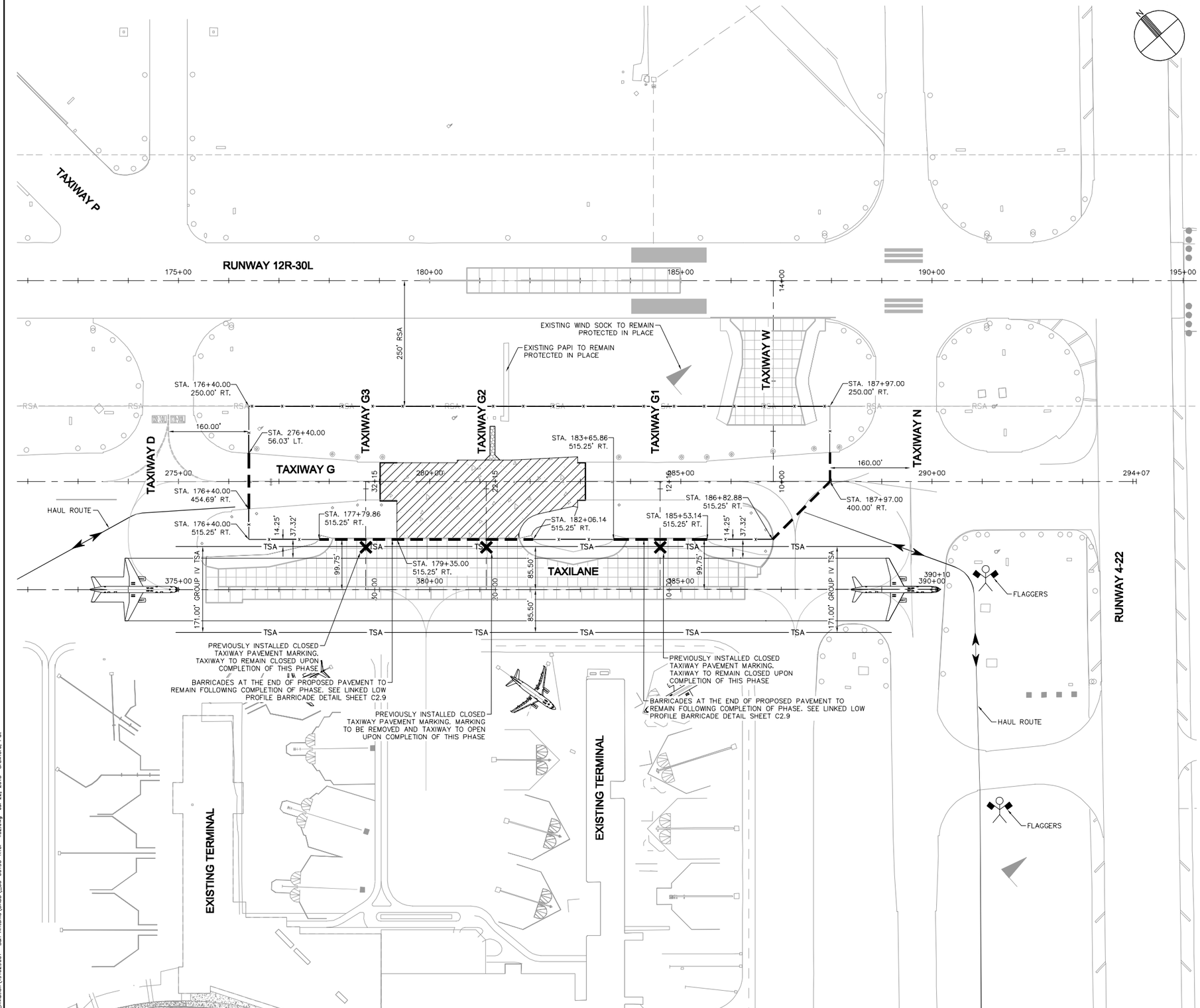

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LEGEND:

- PHASE 2
- PORTLAND CEMENT CONCRETE PAVEMENT
- ASPHALT CONCRETE SHOULDER PAVEMENT
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)
- CLOSED RUNWAY/TAXIWAY PAVEMENT MARKING

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

ALTERNATE 2 PHASE 2 NOTES

1. PHASE 2 CONSISTS OF THE MIDDLE PORTION OF WORK ON TAXIWAY G AND THE NORTH PORTION OF TAXIWAY G2. STATION/OFFSET COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF THIS PHASE. REFER TO GEOMETRIC AND DEMO PLANS FOR CONSTRUCTION LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED 250 FEET (OR MORE) FROM THE CENTERLINE OF RUNWAY 12R/30L, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE TAXILANE, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY G, AND 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY N.
3. THIS PORTION OF TAXIWAY G BETWEEN TAXIWAY D AND TAXIWAY N WILL BE CLOSED TO AIRCRAFT OPERATIONS UNDER THIS PHASE OF CONSTRUCTION.
4. TAXIWAY N, TAXIWAY D, AND THE TAXILANE WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT.
5. TAXIWAY G AND TAXIWAY G2 WILL BE RE-OPENED TO AIRCRAFT OPERATIONS UPON COMPLETION OF THIS PHASE. TAXIWAY G3 AND TAXIWAY G1 WILL REMAIN CLOSED.
6. ANY WORK REQUIRED TO BE COMPLETED WITHIN A TAXILANE/TAXWAY SAFETY AREA WILL REQUIRE A TEMPORARY CLOSURE OF THE TAXILANE/TAXIWAY UNTIL THE WORK WITH THE SAFETY AREA IS COMPLETE.
7. THE CONTRACTOR SHALL PROTECT IN PLACE THE PAPI AND THE WIND SOCK. ANY DAMAGE TO THE EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE AIRPORT. THE CONTRACTOR MUST ALLOW ACCESS TO THESE FACILITIES BY THE FAA OR AIRPORT PERSONNEL FOR MAINTENANCE.

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MICHAEL A. NORBY 85178 REGISTERED PROFESSIONAL ENGINEER
07/22/13

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CONSTRUCTION PHASING PLAN ALT 2 PHASE 2

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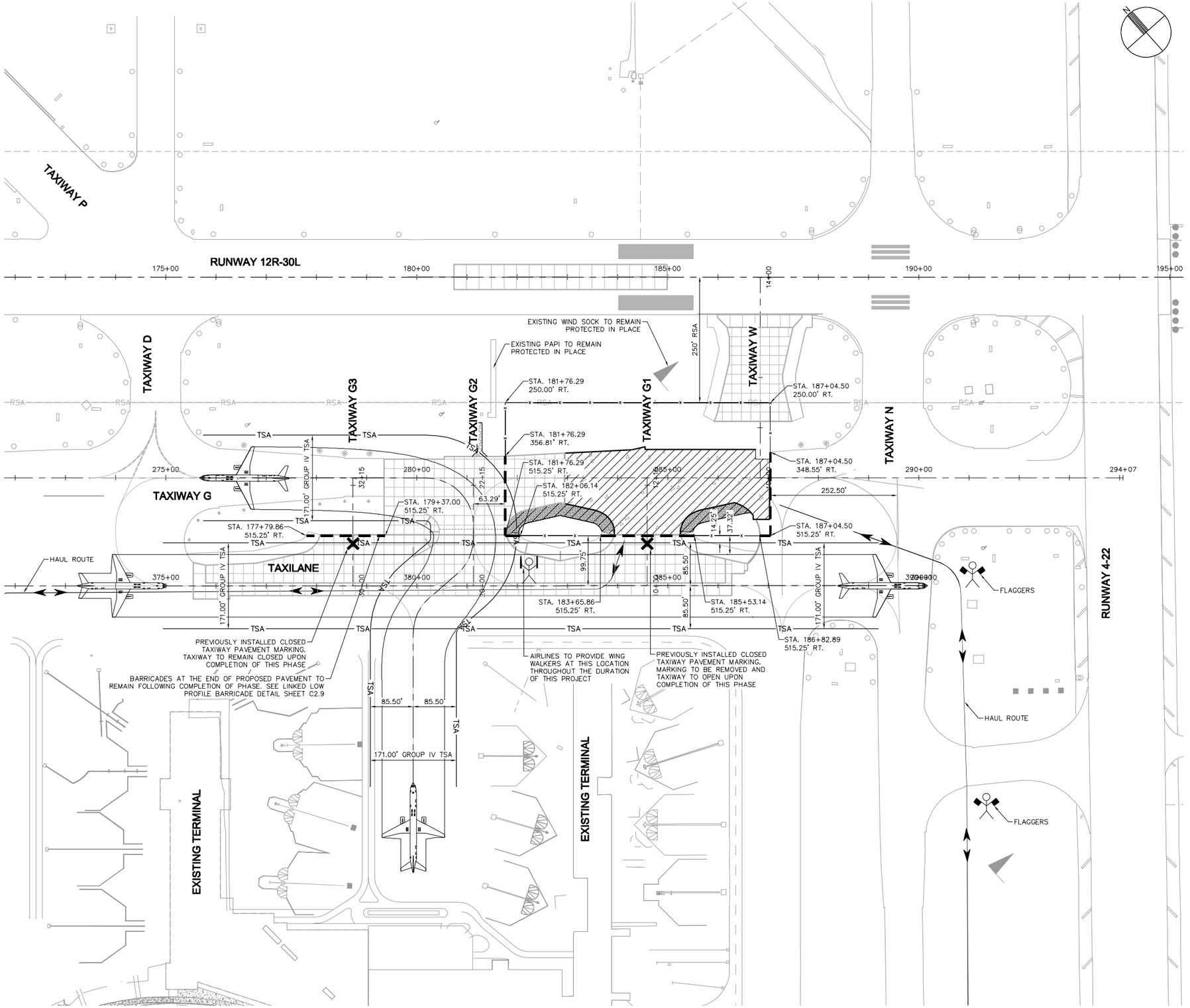

LEGEND:

- PHASE 3
- PORTLAND CEMENT CONCRETE PAVEMENT
- ASPHALT CONCRETE SHOULDER PAVEMENT
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)
- CLOSED RUNWAY/TAXIWAY PAVEMENT MARKING

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

ALTERNATE 3 PHASE 3 NOTES

1. PHASE 3 CONSISTS OF THE SOUTHEAST PORTION OF WORK ON TAXIWAY G AND THE NORTH PORTION OF TAXIWAY G1. STATION/OFFSET COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF THIS PHASE. REFER TO GEOMETRIC AND DEMO PLANS FOR CONSTRUCTION LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED 250 FEET (OR MORE) FROM THE CENTERLINE OF RUNWAY 12R/30L, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE TAXILANE, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE ACTIVE PORTION TAXIWAY G, AND 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY N.
3. THIS PORTION OF TAXIWAY G BETWEEN TAXIWAY N AND TAXIWAY G2 WILL BE CLOSED TO AIRCRAFT OPERATIONS UNDER THIS PHASE OF CONSTRUCTION.
4. TAXIWAY N, TAXIWAY D, AND THE TAXILANE WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT.
5. A PORTION OF TAXIWAY G (FROM TAXIWAY G2 TO TAXIWAY D) WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT.
6. TAXIWAY G2 WILL BE OPEN TO GROUP IV AND LOWER AIRCRAFT, BUT WILL REQUIRE CONSTRUCTION EQUIPMENT/WORKERS TO PULL OUT OF THE TAXIWAY G2 SAFETY AREA (A MINIMUM OF 85.5 FEET FROM THE TAXIWAY G2 CENTERLINE) AND WILL REQUIRE ESCORT BY WING WALKERS.
7. TAXIWAY G AND TAXIWAY G1 WILL BE RE-OPENED TO AIRCRAFT OPERATIONS UPON COMPLETION OF THIS PHASE. TAXIWAY G3 WILL REMAIN CLOSED.
8. ANY WORK REQUIRED TO BE COMPLETED WITHIN A TAXILANE/TAXWAY SAFETY AREA WILL REQUIRE A TEMPORARY CLOSURE OF THE TAXILANE/TAXIWAY UNTIL THE WORK WITH THE SAFETY AREA IS COMPLETE.
9. THE CONTRACTOR SHALL PROTECT IN PLACE THE PAPI AND THE WIND SOCK. ANY DAMAGE TO THE EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE AIRPORT. THE CONTRACTOR MUST ALLOW ACCESS TO THESE FACILITIES BY THE FAA OR AIRPORT PERSONNEL FOR MAINTENANCE.

100 0 100 200
SCALE IN FEET

CITY OF SAN ANTONIO AVIATION DEPARTMENT

SAN ANTONIO AIRPORT SYSTEM

Kimley-Horn and Associates, Inc.
601 NW LOOP 410, SUITE 350
SAN ANTONIO, TEXAS 78216
PHONE: (210) 541-9166
TEXAS REGISTERED FIRM, NO. 928

RUNWAY 12R-30L REHABILITATION AND TERMINAL AREA TAXIWAY IMPROVEMENTS (PACKAGE 1)

MICHAEL A. NORBY 85178 REGISTERED PROFESSIONAL ENGINEER
07/22/13

MARK	DATE	DESCRIPTION
ISSUE:		-
PROJECT NO:		33-00178 and 33-00193
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CONSTRUCTION PHASING PLAN ALT 3 PHASE 3

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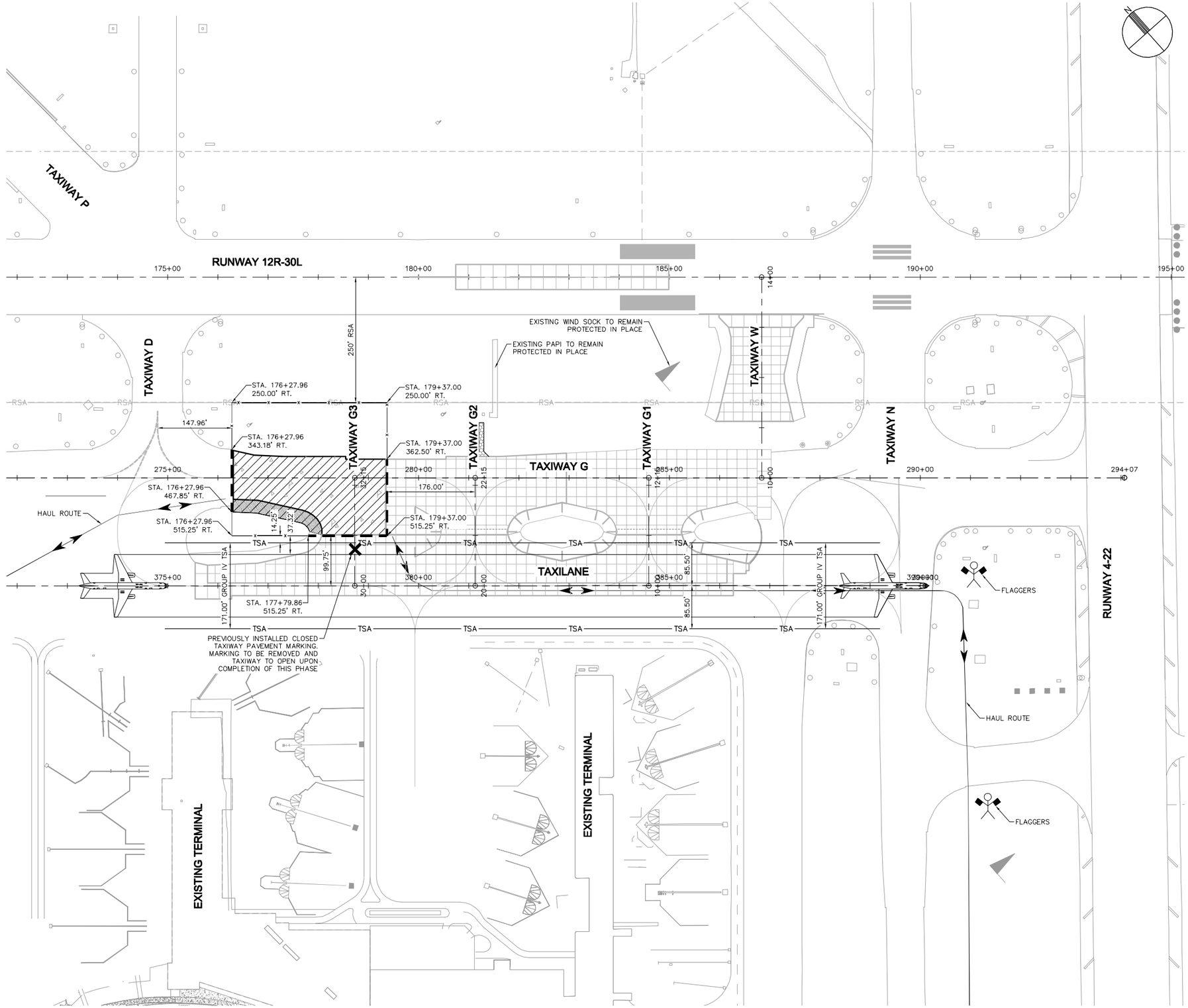

LEGEND:

- PHASE 4
- PORTLAND CEMENT CONCRETE PAVEMENT
- ASPHALT CONCRETE SHOULDER PAVEMENT
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)
- CLOSED RUNWAY/TAXIWAY PAVEMENT MARKING

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

ALTERNATE 4 PHASE 4 NOTES

1. PHASE 4 CONSISTS OF THE NORTHWEST PORTION OF WORK ON TAXIWAY G AND THE NORTH PORTION OF TAXIWAY G3. STATION/OFFSET COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF THIS PHASE. REFER TO GEOMETRIC AND DEMO PLANS FOR CONSTRUCTION LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED 250 FEET (OR MORE) FROM THE CENTERLINE OF RUNWAY 12R/30L, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE TAXILANE, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE ACTIVE PORTION TAXIWAY G, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY G2, AND 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY N.
3. THIS PORTION OF TAXIWAY G BETWEEN TAXIWAY D AND TAXIWAY G2 WILL BE CLOSED TO AIRCRAFT OPERATIONS UNDER THIS PHASE OF CONSTRUCTION.
4. TAXIWAY N, TAXIWAY D, TAXIWAY G1, TAXIWAY G2, AND THE TAXILANE WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT.
5. A PORTION OF TAXIWAY G (FROM TAXIWAY G2 TO TAXIWAY N) WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT.
6. TAXIWAY G AND TAXIWAY G3 WILL BE RE-OPENED TO AIRCRAFT OPERATIONS UPON COMPLETION OF THIS PHASE.
7. ANY WORK REQUIRED TO BE COMPLETED WITHIN A TAXILANE/TAXWAY SAFETY AREA WILL REQUIRE A TEMPORARY CLOSURE OF THE TAXILANE/TAXIWAY UNTIL THE WORK WITH THE SAFETY AREA IS COMPLETE.
8. THE CONTRACTOR SHALL PROTECT IN PLACE THE PAPI AND THE WIND SOCK. ANY DAMAGE TO THE EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE AIRPORT. THE CONTRACTOR MUST ALLOW ACCESS TO THESE FACILITIES BY THE FAA OR AIRPORT PERSONNEL FOR MAINTENANCE.

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MICHAEL A. NORBY 87178 REGISTERED PROFESSIONAL ENGINEER
07/22/13

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CONSTRUCTION PHASING PLAN ALT 4 PHASE 4

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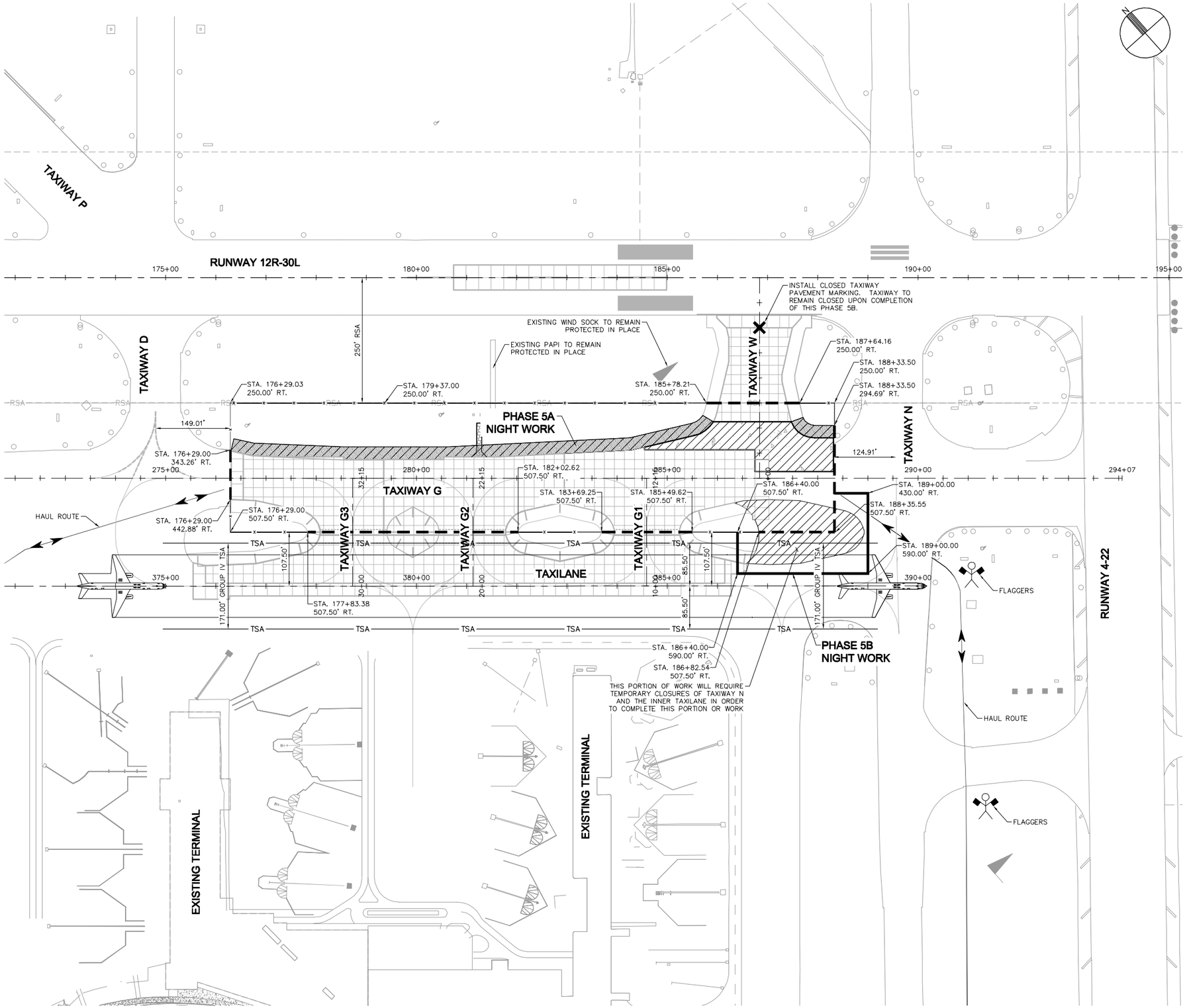

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LEGEND:

- PHASE 5
- PORTLAND CEMENT CONCRETE PAVEMENT
- ASPHALT CONCRETE SHOULDER PAVEMENT
- SAFETY FENCE
- LOW PROFILE BARRICADES
- HAUL ROUTE
- FLAGGER (TO BE SUPPLIED BY CONTRACTOR)
- WING WALKER (TO BE SUPPLIED BY AIRLINES)
- CLOSED RUNWAY/TAXIWAY PAVEMENT MARKING

GENERAL PHASE NOTES

1. A SEPARATE NTP WILL BE ISSUED FOR EACH PHASE.
2. ACCESS TO THE WORK AREA IS SHOWN ON THE OVERALL PLAN SHEETS.
3. EXISTING AIRFIELD LIGHTING CIRCUITS MUST REMAIN IN SERVICE FOR ALL AREAS OPEN TO AIRCRAFT DURING ALL HOURS OF DARKNESS AND DURING INSTRUMENT METEOROLOGICAL CONDITIONS (BELOW 1000' CEILING OR LESS THAN 3 MILES OF VISIBILITY) UNLESS PRIOR APPROVAL HAS BEEN OBTAINED FROM THE AIRPORT. NO DIRECT PAY FOR JUMPERS. CURRENT WEATHER CONDITIONS FOR THE AIRPORT MAY BE OBTAINED BY CALLING (210) 805-5583.
4. THE CONTRACTOR SHALL REMOVE OR COVER ALL AIRFIELD GUIDANCE SIGNS FOR RUNWAYS AND TAXIWAYS THAT ARE CLOSED DURING EACH PHASE (NO DIRECT PAY).
5. THE CONTRACTOR SHALL REMOVE ALL TAXIWAY CENTERLINES LEADING INTO THE CONSTRUCTION AREA PRIOR TO THE COMMENCEMENT OF EACH PHASE (PAVEMENT MARKING REMOVAL) (NPI).

ALTERNATE 5 PHASE 5 NOTES

1. PHASE 5 CONSISTS OF THE NORTH SHOULDER OF TAXIWAY G, THE AREA CONNECTING TAXIWAY W AND TAXIWAY G, AND THE MARKING OF THE INFIELD AREA ADJACENT TAXIWAY G AND TAXIWAY N. STATION/OFFSET COORDINATES ARE TO PROVIDE THE GENERAL LOCATION OF THIS PHASE. REFER TO GEOMETRIC AND DEMO PLANS FOR CONSTRUCTION LIMITS.
2. FENCING AND BARRICADES MUST BE PLACED 250 FEET (OR MORE) FROM THE CENTERLINE OF RUNWAY 12R/30L, 85.5 FEET (OR MORE) FROM THE CENTERLINE OF THE TAXILANE, AND 85.5 FEET (OR MORE) FROM THE CENTERLINE OF TAXIWAY N.
3. TAXIWAY G1, TAXIWAY G2, TAXIWAY G3 AND THE PORTION OF TAXIWAY G BETWEEN TAXIWAY D AND TAXIWAY N WILL BE CLOSED TO AIRCRAFT OPERATIONS UNDER THIS PHASE OF CONSTRUCTION.
4. TAXIWAY N, TAXIWAY D, AND THE TAXILANE WILL REMAIN OPEN TO GROUP IV AND LOWER AIRCRAFT.
5. TAXIWAY G, TAXIWAY G1, TAXIWAY G2, AND TAXIWAY G3 WILL BE RE-OPENED TO AIRCRAFT OPERATIONS UPON COMPLETION OF THIS PHASE.
6. ANY WORK REQUIRED TO BE COMPLETED WITHIN A TAXILANE/TAXWAY SAFETY AREA WILL REQUIRE A TEMPORARY CLOSURE OF THE TAXILANE/TAXIWAY UNTIL THE WORK WITH THE SAFETY AREA IS COMPLETE.
7. THE CONTRACTOR SHALL PROTECT IN PLACE THE PAPI AND THE WIND SOCK. ANY DAMAGE TO THE EQUIPMENT SHALL BE REPORTED IMMEDIATELY TO THE AIRPORT. THE CONTRACTOR MUST ALLOW ACCESS TO THESE FACILITIES BY THE FAA OR AIRPORT PERSONNEL FOR MAINTENANCE.

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MICHAEL A. NORBY 57178 REGISTERED PROFESSIONAL ENGINEER 07/22/13

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CONSTRUCTION PHASING PLAN ALT 5 PHASE 5A & 5B

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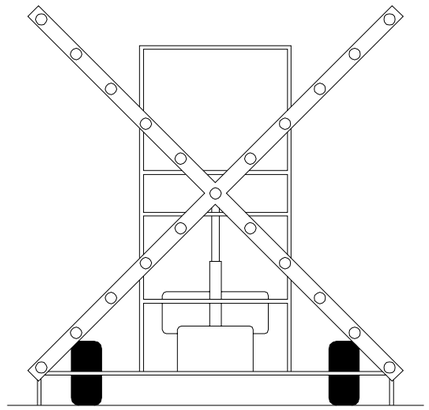


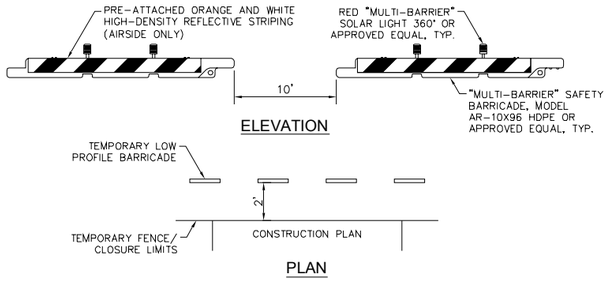
PORTABLE LIGHTED RUNWAY CLOSURE MARKER

THREE LOCATIONS AS SHOWN ON PLANS

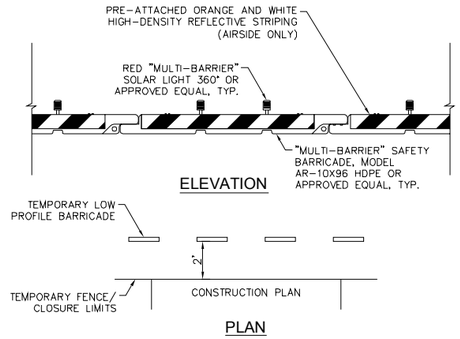
LIGHTED X NOTES

PORTABLE LIGHTED RUNWAY CLOSURE MARKERS (LIGHTED "X") SHALL MEET ALL OF THE FOLLOWING CONDITIONS:

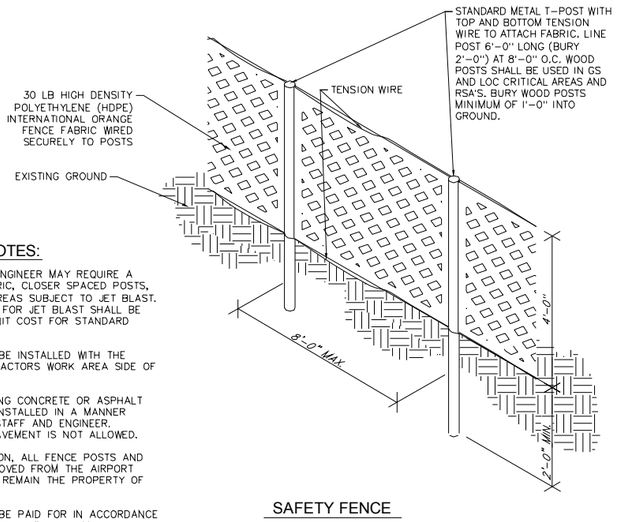
1. WILL BE PROVIDED AND MAINTAINED BY THE CONTRACTOR THROUGHOUT THE DURATION OF THE PROJECT. CONTRACTOR SHALL BE NOTIFIED IMMEDIATELY IF ANY DISRUPTION TO THE LIGHTED RUNWAY CLOSURE MARKERS IS NOTICED DURING WORK HOURS.
2. BE A PORTABLE, TOWABLE UNIT THAT CAN BE QUICKLY REMOVED FROM THE RUNWAY.
3. CONSIST OF CLEAR INCANDESCENT LAMPS OR TRANSMIT A WHITE COLOR, ARRANGED IN THE SHAPE OF A LETTER "X" WITH ARMS CROSSED AT AN APPROPRIATE ANGLE TO MAKE THE "X" DISCERNIBLE. THE ARMS SHALL BE PAINTED YELLOW ON ALL SIDES SO THAT THE UNIT WILL BE CLEARLY VISIBLE WHEN IT IS IN POSITION.
4. BE ENERGIZED BY A PORTABLE POWER SUPPLY.
5. BE CONTROLLED SO THAT THE LIGHTED SIGNAL WILL FLASH AT AN APPROXIMATE RATE OF TWO AND A HALF TO THREE (2.5–3) SECONDS "ON" AND ONE TO TWO AND A HALF (1–2.5) SECONDS "OFF".
6. PROVIDE THE FOLLOWING DAYTIME AND NIGHTTIME VISUAL REFERENCE DURING VISUAL FLIGHT RULE (VFR) CONDITIONS WHEN PLACED ON CENTERLINE PER THE DIMENSIONS SHOWN ON THE PLANS:
   (A) VISIBLE TO THE PILOT AT A RANGE OF AT LEAST FIVE NAUTICAL MILES.
   (B) RECOGNIZABLE AS A LETTER "X" FROM A RANGE OF AT LEAST ONE NAUTICAL MILE.
7. PROVIDE LAMP DIMMING CAPABILITY FOR NIGHTTIME OPERATIONS.
8. PRODUCE A SIGNAL THAT PROVIDES A HORIZONTAL COVERAGE TO AT LEAST FIFTEEN DEGREES (15°) ON EACH SIDE OF THE RUNWAY CENTERLINE AND A VERTICAL COVERAGE FROM ZERO DEGREES (0°) TO TEN DEGREES (10°) ABOVE HORIZONTAL, BOTH DAY AND NIGHT, AT A RANGE OF ONE NAUTICAL MILE.
9. ADJUSTABLE AIMING AND LEVELING TO ALLOW TILTING TO AN OPTIMUM ANGLE OF THREE DEGREES (3°) FROM VERTICAL.
10. WITHSTAND A MINIMUM WIND SPEED OF AT LEAST FORTY MILES PER HOUR (40 MPH) WITHOUT AFFECTING AIMING OR OPERATION.
11. INCLUDE AN ILLUMINATED FAILURE INDICATOR THAT IS VISIBLE FROM THE BACK (RUNWAY SIDE) OF THE UNIT.
12. INCLUDE AN OPERATIONS PLACARD IN A CONSPICUOUS LOCATION THAT INSTRUCTS OPERATORS TO VISUALLY CHECK THE OPERATION OF THE DEVICE EVERY TWO HOURS.
13. ONE PERSON SET UP IN LESS THAN FIVE MINUTES.
14. DIESEL PORTABLE POWER WITH ADAPTER TO RUN DIRECTLY FROM ELECTRICAL OUTLETS.
15. TRAILER HITCH OPTIONS INCLUDING TANDEM TOWING FOR ON–AIRPORT OPERATIONS.
16. ABILITY TO PROVIDE UP TO ONE HUNDRED AND TWENTY (120) HOURS OF CONTINUOUS OPERATION.
17. FAIL SAFE PROTECTION TO ENSURE THAT THE UNIT STAYS ON AS CONTINUOUS LIGHT IF THE FLASHER UNIT SHOULD FAIL.
18. DIMENSIONING AND LIGHTING ARRANGEMENT SHALL FOLLOW THE DESIGN RECOMMENDATION PER FAA AC 150/5345–55.



LOW PROFILE BARRICADE



LINKED LOW PROFILE BARRICADE



SAFETY FENCE

SAFETY FENCE NOTES:

1. THE SAT STAFF AND ENGINEER MAY REQUIRE A STRONGER FENCE FABRIC, CLOSER SPACED POSTS, AND/OR BRACES IN AREAS SUBJECT TO JET BLAST. AREAS STRENGTHENED FOR JET BLAST SHALL BE PAID AT TWICE THE UNIT COST FOR STANDARD SAFETY FENCE.
2. SAFETY FENCE SHALL BE INSTALLED WITH THE FABRIC ON THE CONTRACTORS WORK AREA SIDE OF THE POST.
3. SAFETY FENCE CROSSING CONCRETE OR ASPHALT PAVEMENT SHALL BE INSTALLED IN A MANNER ACCEPTABLE TO SAT STAFF AND ENGINEER. ANCHORING TO THE PAVEMENT IS NOT ALLOWED.
4. AT PROJECT COMPLETION, ALL FENCE POSTS AND FABRIC SHALL BE REMOVED FROM THE AIRPORT PROPERTY AND SHALL REMAIN THE PROPERTY OF THE CONTRACTOR.
5. SAFETY FENCE SHALL BE PAID FOR IN ACCORDANCE WITH ITEM 100 "MOBILIZATION" BID ITEM 100.3 AIRSIDE SAFETY, SECURITY, AND TRAFFIC CONTROL.

AWARDED PORTION OF CONTRACT	NUMBER OF BARRICADES TO REMAIN ON AIRPORT PROPERTY
BASE BID	19
BASE BID & ALT. 1	81
BASE BID & ALT 1 & 2	51
BASE BID & ALT 1, 2 & 3	35
BASE BID & ALT 1, 2, 3, & 4	19
BASE BID & ALL ALT .	0

NOTES

1. CONTRACTOR TO PROVIDE BARRICADES AND LIGHTS FOR THE DURATION OF THE PROJECT, TO BE REMOVED UPON COMPLETION OF THE PROJECT. THE CONTRACTOR SHALL ALSO PROVIDE THE AIRPORT NEW BARRICADES AND LIGHTS TO REMAIN AIRPORT PROPERTY ASSOCIATED WITH DIFFERENT PHASES OR THE PROJECT. THESE ARE TO REMAIN IN LOCATIONS SET ON THE PLANS AND BE MAINTAINED BY THE AIRPORT. SEE TABLE 1, THIS SHEET FOR REQUIRED AMOUNT OF BARRICADES TO BE SUPPLIED BASED ON AWARD.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING PROPER POSITIONING OF ALL BARRICADES AND FILLING WITH WATER. ANY BARRICADES DAMAGED DURING CONSTRUCTION WILL BE IMMEDIATELY REPLACED. (NPI)
3. LOW PROFILE BARRICADES SHALL BE PARALLEL TO THE CONSTRUCTION PERIMETER.
4. AROUND OPEN TRENCHES AND LARGE DROP OFFS, GREATER THAN ONE FOOT, THE CONTRACTORS SHALL HOOK THE BARRICADES TOGETHER. SEE PLANS FOR DIMENSIONS.

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PHASING DETAILS

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